Chapter 5
Conceptual Designs, Operational Assessments and Financial Analysis

I. INTRODUCTION

The Task 5 Report documents the results of the evaluation of the conceptual alternative improvements discussed in the Task 4 report. This evaluation was based on several criteria including accessibility and mobility, cost-effectiveness, safety impacts, operational characteristics, regulatory concerns, regional benefits and environmental sensitivity. Since the environmental sensitivity analysis involves a whole subset of criteria to be evaluated, it was documented as a separate report, found in Chapter 7.

Three main strategies were preliminarily identified as sensible to the SR-60 corridor: allowing trucks to share the carpool lanes at limited time periods, adding truck lanes to the freeway at grade and adding lanes above the freeway grade. Table 1 presents a matrix describing the advantages and disadvantages of each strategy.

Based on the characteristics of each alternative for each criteria and on the year 2020 truck volumes forecast to use the truck facility (Chapter 3 provides a complete discussion on truck volumes), it was decided that some of the preliminary strategies would not be ideal to this particular corridor. The "mix trucks with carpools" alternative created safety problems due to the variability of speed between automobiles and trucks and blocked visibility. Operationally, it did not allow for passing opportunities or provided storage space for breakdowns. It also invoked regulatory issues since state law limits trucks to right lanes, and carpool lanes contain usage limitations due to funding sources. Finally, upon examination of the estimated year 2020 truck volumes, it was determined that there is demand for a four lane truck facility and this option does not provide any added capacity to the corridor.

As mentioned above, the year 2020 truck volumes forecast indicated that a four-lane facility would be required to accommodate the truck demand. Consequently, only the alternatives recommending the addition of four truck lanes were examined in a more detailed analysis. The remainder of this report discusses these analyzes for two final conceptual alternatives: adding four lanes at grade and adding four lanes above the freeway grade.

TABLE 5.1
STRATEGIES FOR TRUCK LANES

OPTION*	CONSIDERATIONS					
	Accessibility/Mobility	Cost-Effectiveness	Environmental Issues	Safety	Operation	Regulatory Issues
A. "Mix trucks with carpools"						
1. time-limited (off-peak only) [includes 70 new ramps]	-- no added capacity -- no exclusive lanes for trucks	-- need to build new lanes from I-710 to I-605 -- lanes may need to be rebuilt to accommodate trucks' weight --moderate infrastructure investment	-- little ROW** acquisition required	-- large speed differentials between trucks and autos -- blocked visibility -- weaving to access lane -- non-standard lanes	-- lane closure due to truck break down -- no passing opportunities -- additional ramp structures required -- enforcement issues	-- Carpool lane funding limits*** -- state law limits trucks to right lanes
2. access-limited (through-trucks only) [includes 12 new ramps]	-- no added capacity -- no exclusive lanes for trucks	-- need to build new lanes from I-710 to I-605 -- lanes may need to be rebuilt to accommodate trucks' weight --relatively low infrastructure investment	-- little ROW** acquisition required	-- large speed differentials between trucks and autos -- blocked visibility -- non-standard lanes	-- lane closure due to truck break down -- no passing opportunities -- additional ramp structures required at selected locations (710, 605, 57 &15)	-- Carpool lane funding limits*** -- state law limits trucks to right lanes
3. Time- and access-limited [includes 12 new ramps]	-- no added capacity -- no exclusive lanes for trucks	-- need to build new lanes from I-710 to I-605 -- lanes may need to be rebuilt to accommodate trucks' weight --relatively low infrastructure investment	-- little ROW** acquisition required	-- large speed differentials between trucks and autos -- blocked visibility -- non-standard lanes	-- lane closure due to truck break down -- no passing opportunities -- additional ramp structures required at selected locations (710, 605, 57 &15)	-- Carpool lane funding limits*** -- state law limits trucks to right lanes
B. "Add truck lanes at freeway grade"						
1. Designate/separate 2 outside lanes [includes 70 new ramps]	-- no added capacity -- may reduce capacity	--no ROW** acquisition required --large separation costs	--no ROW** acquisition required	-- reduction in truck/auto mixing	-- additional ramp structures required at every on-off ramp -- 60-57 weave may be blocked	-- costs not recoverable through user fees****
2. Add two reversible lanes [includes 38 new ramps]	-- increased capacity	--some ROW** acquisition --moderate infrastructure investment	--some ROW** acquisition	-- potential for head-on collisions	-- new passing opportunities -- additional ramp structures required at selected locations -- peak directions not easily identified (volume of trucks balanced most hours)	
3. Add one lane each direction with passing lanes/zones [includes 38 new ramps]	-- increased capacity	--some ROW** acquisition --moderate infrastructure investment	--some ROW** acquisition	-- reduction in truck/auto mixing	-- new passing opportunities -- additional ramp structures required at selected locations	-- costs less likely to be recoverable through user fees
4. Add four lanes (two each direction on each side of freeway) [includes 38 new ramps]	-- increased capacity	-- large amount of ROW** acquisition required --large infrastructure investment	-- large amount of ROW** acquisition required	-- reduction in truck/auto mixing	-- new passing opportunities -- additional ramp structures required at selected locations	
C. "Add new lanes above freeway grade"						
1. Add new auto-only lanes above freeway grade (dedicate lanes for trucks at freeway grade) [includes 38 new ramps]	-- increased capacity	-- largest infrastructure investment	-- possible noise issues --some ROW** acquisition	-- reduction in truck/auto mixing	-- additional ramp structures required at selected locations -- many options for allocating lanes among trucks, HOV, other vehicles	
2. Add new truck-only lanes above freeway grade [includes 38 new ramps]	-- increased capacity	-- largest infrastructure investment	-- truck noise --some ROW** acquisition	-- reduction in truck/auto mixing -- potential for more serious accidents	-- additional ramp structures required at selected locations -- ramp structures must not be too steep for trucks	

NOTES:

* All options assume (1) separate truck lanes are dedicated to trucks but trucks may use other lanes as well and (2) any construction results in standard dimensions for all lanes and shoulders.

** ROW = Right of Way

*** Federal funds used to build carpool lanes were dedicated only to serve carpools.

**** Fees to use existing lanes are not allowed under federal law.

This report is divided into nine chapters - Chapter 3 explains the process undergone to obtain the year 2020 volume forecasts, and it also presents these estimated volumes. Chapter 5 describes the conceptual alternatives designs, and includes a preliminary analysis on the operational and safety issues for each conceptual alternative. Chapter 6 contains the cost and financial analysis for each conceptual alternative, in addition to an alternatives analysis evaluation. Finally, a priority scheme for the implementation of the conceptual alternatives is developed in Chapter 9.

II. FORECAST OF DEMAND FOR SEPARATE TRUCK FACILITIES

In order to evaluate the effectiveness of the proposed truck lane improvements to the SR-60, projected future year 2020 traffic volumes on the facility were necessary. This data, obtained from SCAG, was provided in the form of "link volumes"; traffic volumes on the mainline SR-60 or on major arterials near the freeway. The link volumes were output from SCAG's regional heavy-duty truck (HDT) traffic model, which is used to forecast travel demands in this portion of Southern California. Projections of future traffic volumes for "all vehicles' (i.e., automobiles, buses, RV's, and trucks) and "trucks only" (trucks with three or more axles) were provided for both the year 2020 Base scenario and the 2020 Truck Lanes alternative scenario. The Base scenario reflects anticipated future traffic conditions without the proposed truck lane improvements, while the Truck Lane Alternative scenario incorporates new truck lanes on the SR-60 between the I-710 and I-15 Freeways into the HDT traffic model. The forecast 2020 "all vehicles" traffic volumes, including projected traffic, are shown in Figure 1. Figure 2 displays only the projected number of trucks for the year 2020, while Figure 3 shows the percentage of trucks on the mainline lanes in comparison to the total number of vehicles.

To determine the capacity requirement for the exclusive truck facility, a thorough review of the forecast year 2020 "truck only" volumes shown in Figure 2, was conducted. First, these volumes were converted to "peak hour" volumes by applying a peak hour factor of 16 percent at the two terminus segments of the study corridor (at the I-710 and the I-15) and 11 percent elsewhere in the corridor. These peak hour factors represent the percentage of the daily traffic that utilizes the facility at the peak hour, and they were derived by comparing existing peak hour counts with the existing daily volumes provided by SCAG. Table 2 shows the estimated 1994 and 2020 peak hour volumes at five critical locations in the SR-60 corridor.

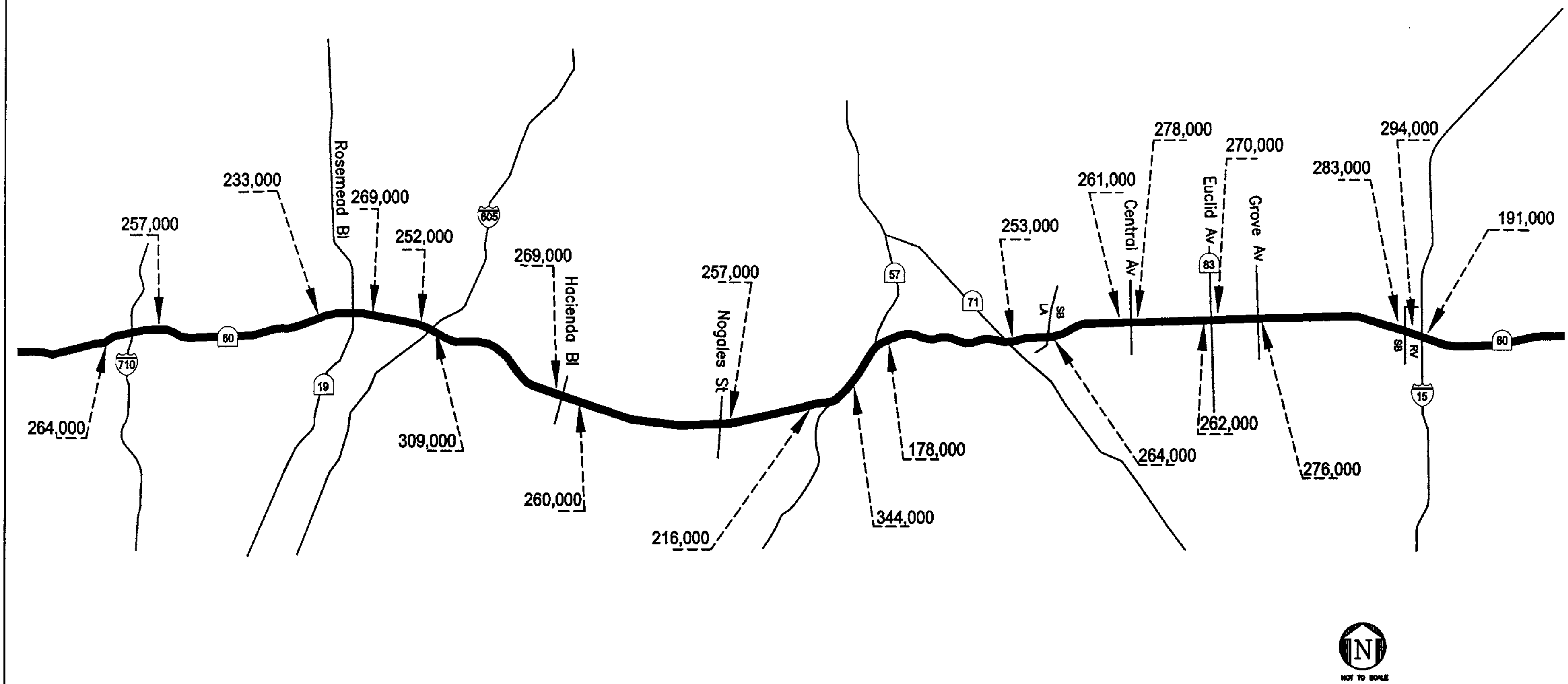

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Figure 5.1

TOTAL AVERAGE DAILY TRAFFIC - 2 WAY -- YEAR 2020

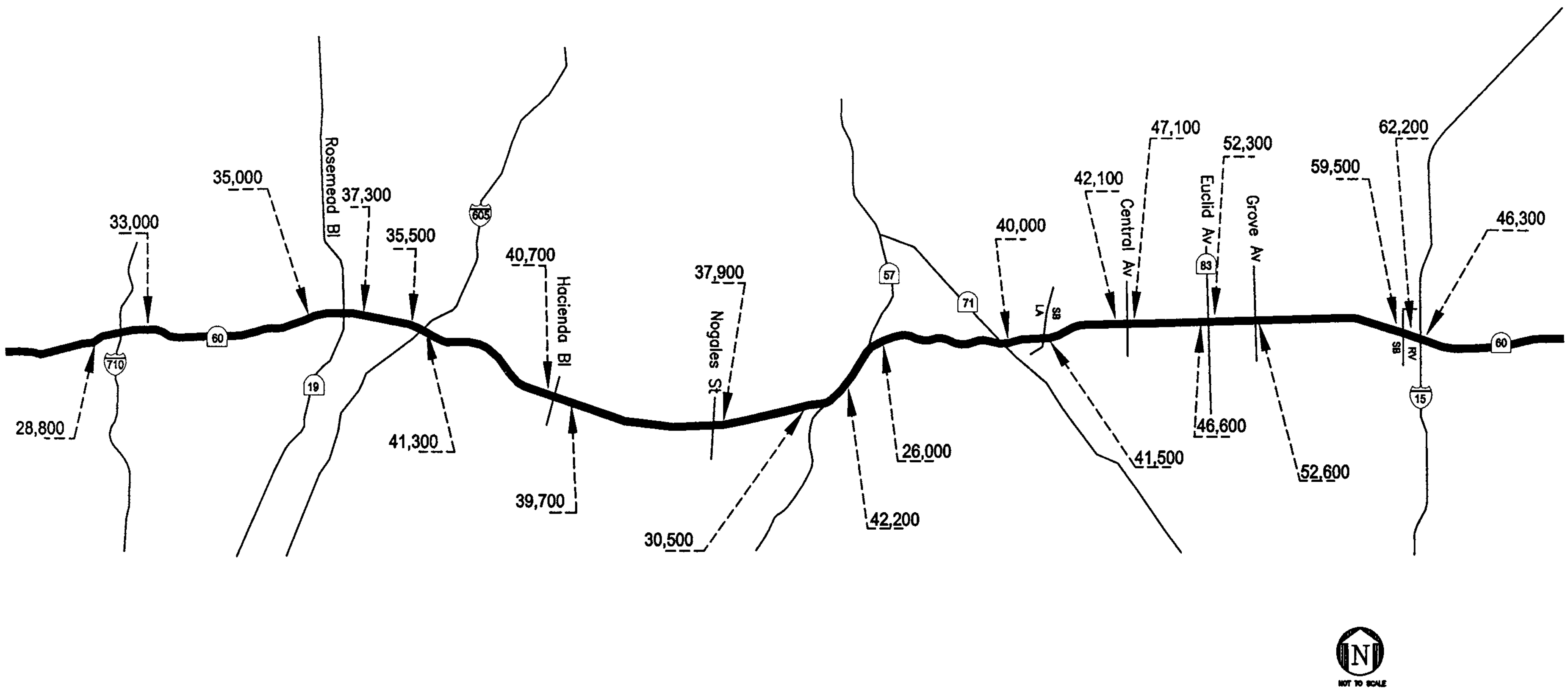

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Figure 5.2

3 + AXLE TRUCK TOTAL AVERAGE DAILY TRAFFIC - 2 WAY -- YEAR 2020

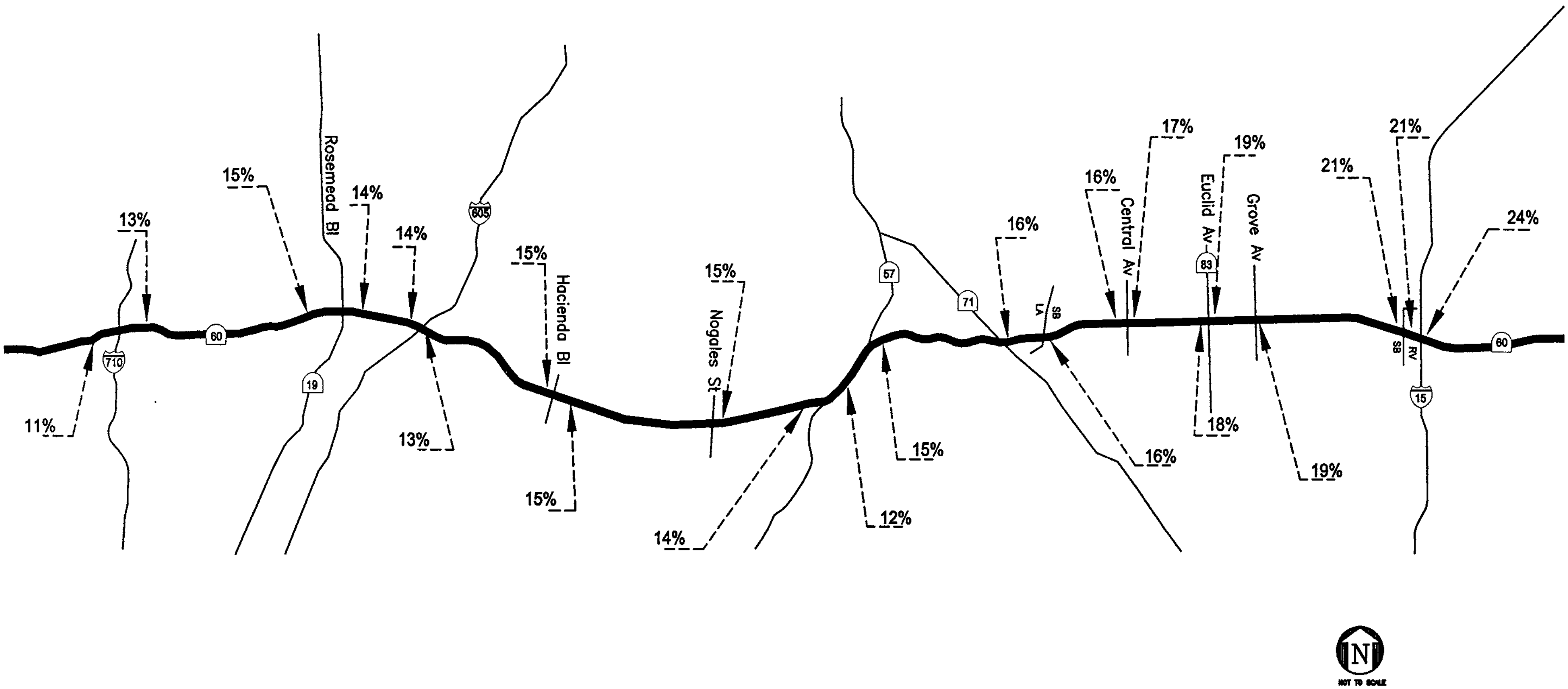

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Figure 5.3
DAILY TRUCKS PERCENTAGE OF TOTAL VEHICLES - YEAR 2020

TABLE 5.2

SR-60 PEAK HOUR VOLUMES

Location	1994 Volumes	2020 Volumes	Growth
West end	1,890	2,850	960
East of 1-605	1,360	2,200	840
SR-57 merge	1,474	2,970	1,496
East of SR-71	1,180	2,310	1,130
East end	2,200	4,000	1,800

The current volume of trucks in the SR-60 freeway combined with the other vehicles utilizing the two slow lanes in the facility is higher than the capacity provided by those lanes. Consequently, the growth in truck traffic should be ideally accommodated by the exclusive truck facility in an attempt to preclude the SR-60 freeway from reaching unacceptable levels of congestion. Since an exclusive truck lane can accommodate approximately 800 trucks per hour, the predicted growth in truck traffic would warrant a facility consisting of two truck lanes in each direction.

Once this basic determination was made, it was appropriate to begin a more detailed evaluation of both the capacity and operational conditions of the facility. This evaluation consisted of the capacity analysis of the mainline freeway truck lanes, and the preliminary design of the "truck only" freeway-to-freeway connectors and surface street access ramps, as well as an analysis of the operational characteristics of those components.

MAINLINE TRUCK LANE TRAFFIC VOLUME PROJECTIONS

To evaluate the operations of the mainline truck lane facility, as well as the future operations of the remaining mixed-flow mainline lanes, it was necessary to determine how many of the total number of trucks on the freeway would utilize the exclusive facility. This was accomplished by SCAG's modifying the baseline HDT traffic model to incorporate the exclusive two-lanes per direction truck facility. The "build" HDT model also included the freeway-to-freeway connectors and surface street ramps which provide access to and from the freeway and the truck facility.

The HDT model, including the proposed mainline truck lanes, freeway connectors and surface street ramps was then re-run by SCAG staff to produce an estimate of truck utilization of the exclusive facilities. (It should be noted that significant delays were experienced during this phase of the Feasibility Study due to calibration and output problems with the HDT model.) Following the release of the traffic volume projections, the consulting team, Caltrans and SCAG staff conducted spot checks of the volumes, and concluded that although the HDT model needs further refinement, the available data could be used as a planning tool for purposes of determining the capacity required for the proposed truck lane facility to operate effectively.

Figure 4 displays the results of the "build" scenario HDT model runs. As shown in the Figure, the model estimates that less than one-half of all projected future truck traffic is expected to use the exclusive facility. The consulting team expresses significant reservations as to the validity of these projections, as the SCAG truck traffic splits in the exclusive truck lanes average approximately 47 percent of total trucks between the I-710 and I-15. These results would suggest that future truck traffic would prefer to remain on the already-congested mixed-flow mainline lanes rather than divert to the lesser-utilized exclusive facilities. These results are not affected by any factors other than capacity and access (ramp locations); direct costs such as user fees are not factored into this stage of the analysis.

Despite the concerns regarding the low number of trucks projected to utilize the exclusive lanes, the output values from the "build" HDT model scenario were used to evaluate the operations of the truck lanes and mainline mixed-flow lanes for future conditions. However, in order to present reasonable conclusions, the ramp operations analysis required some modifications to the output data, as described below. Similarly, the economic analysis used modified mainline volumes, as described in detail later in Chapter VI of this report.

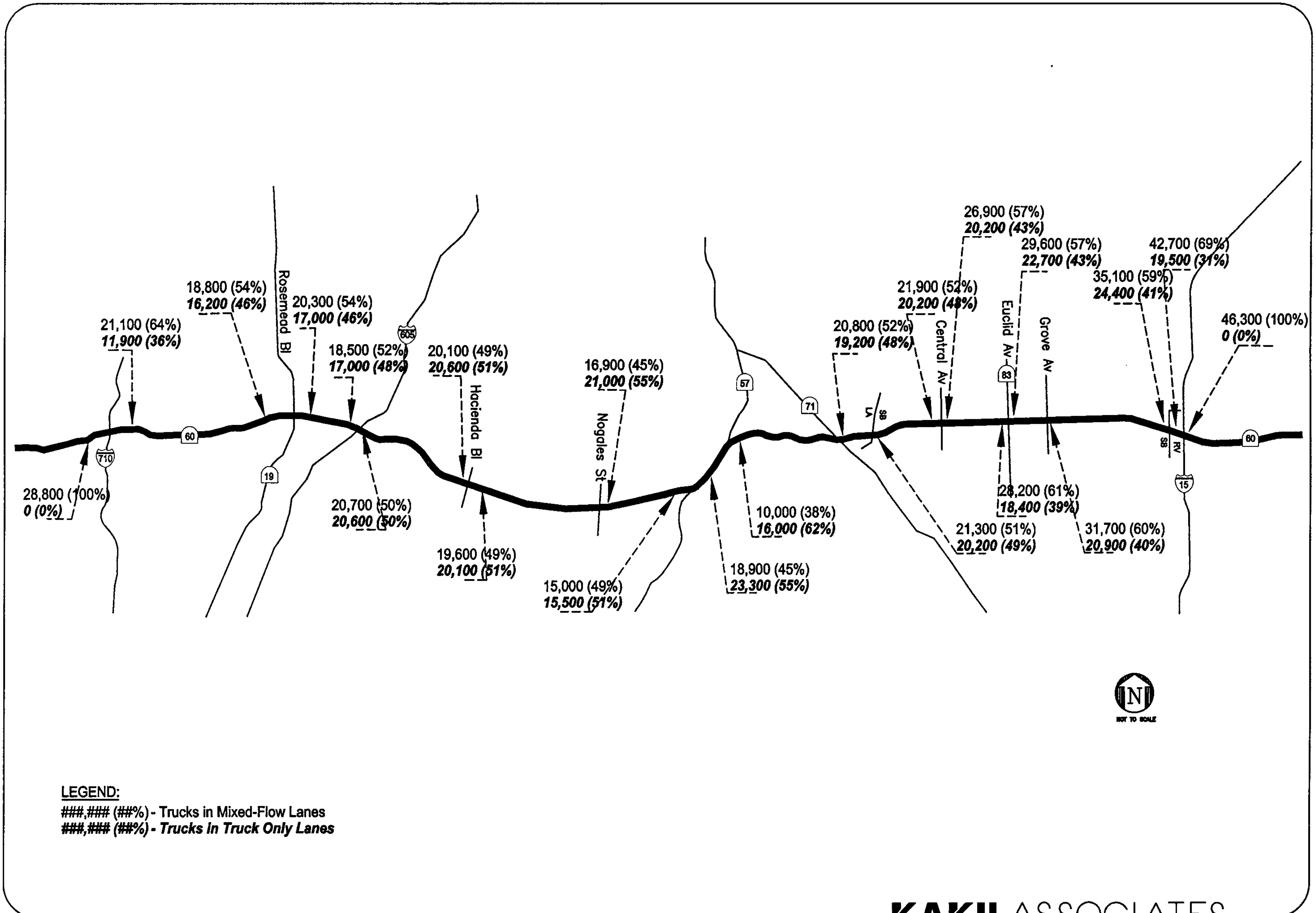

Figure 5.4

DAILY TRUCKS BY FACILITY - YEAR 2020

FREEWAY CONNECTORS AND SURFACE STREET RAMP VOLUMES

The truck ramp analyses utilized the projected 2020 traffic volumes described above, but also required estimation of the future traffic volumes utilizing the SR-60 on and off ramps. Ordinarily, these volumes would be obtained from the traffic model used to evaluate the roadway network. However, the SCAG's HDT model is a regional tool only, and due to the manner in which the future year traffic scenarios were designed, it does not contain the detailed volume projections for the SR-60 on and off ramps.

Therefore, in order to estimate the ramp volumes, the turning movement volumes at the surface street terminus of each of the analyzed ramp locations had to be determined and then aggregated into ramp volumes. For example, the volume of traffic on the SR-60 on-ramp at Atlantic Boulevard consists of the sum of the northbound vehicles on Atlantic Boulevard turning right onto the ramp, and southbound Atlantic Boulevard vehicles turning left onto the ramp. However, again due to software problems that plague the HDT model, its design as a regional forecasting tool, and SCAG's relative inexperience with these more localized volume requirements made the task of obtaining the necessary volumes very difficult. Consequently, due to the extreme time requirements and SCAG's staff availability constraints, only the truck volumes at the locations where access to the exclusive truck lanes was provided were obtained. These volumes were then aggregated into ramp volumes, and plotted to try to validate them.

Not unexpectedly, large discrepancies between the "truck only" volumes for the 2020 Base versus the 2020 Truck Lanes Alternative scenarios were found. Comparisons of the truck volumes output from the Truck Lanes Alternative scenario found that the number of vehicles utilizing the mainline SR-60 and those using the ramps were not consistent along the corridor. However, due to schedule constraints, further model adjustments could not be accommodated, and it was decided that the "truck only" volumes obtained from the 2020 Base scenario would be used for the localized ramp volumes, since they appear to be sufficiently consistent for this level of analysis. These "truck only" daily ramp volumes are shown in Figure 5. Although the Feasibility Study is proceeding under the assumptions just described, the consultants strongly recommend that before a more detailed design study is conducted, the HDT traffic model be refined so that more reliable volumes can be obtained.

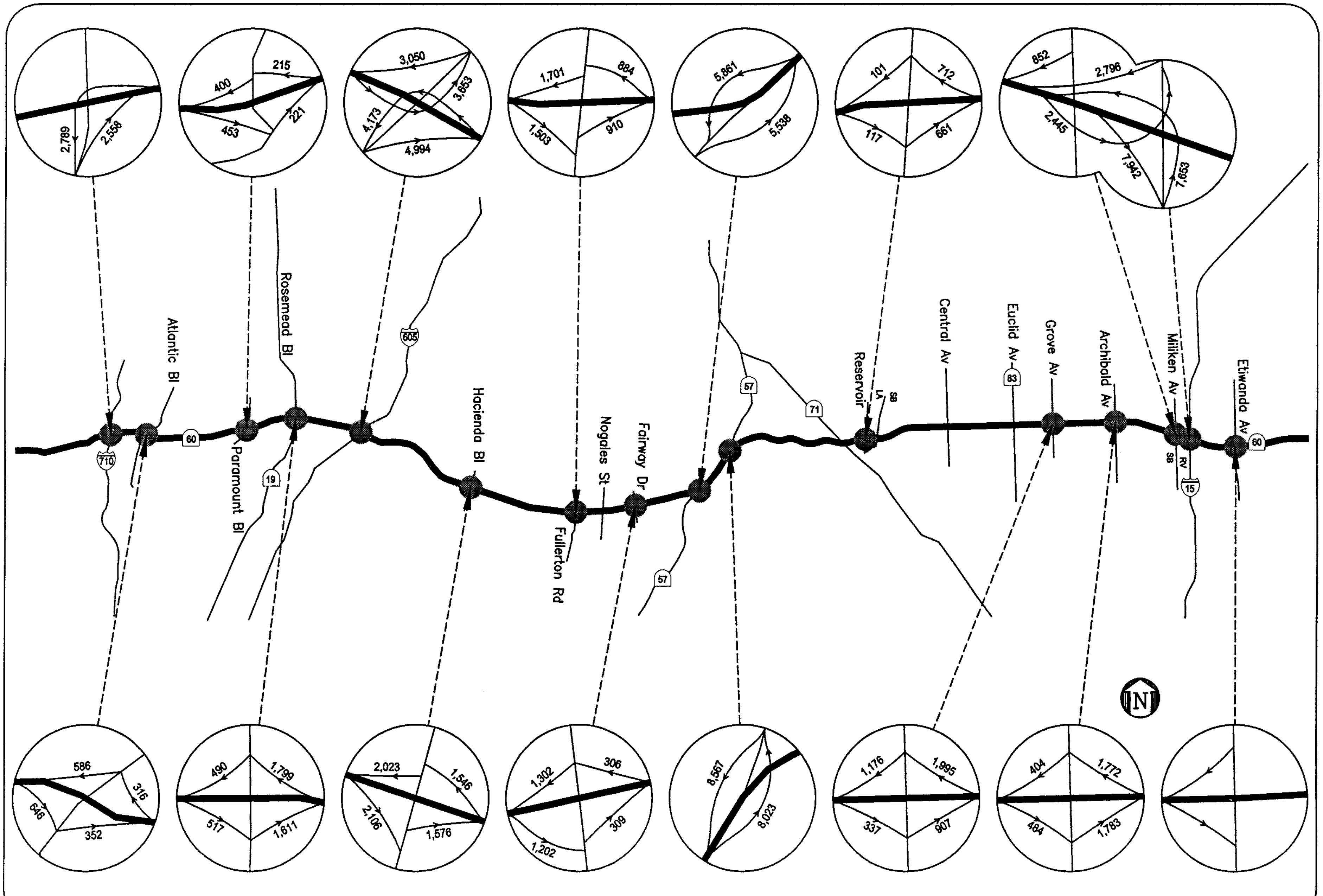

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Figure 5.5
TRUCK ONLY RAMPS - DAILY VOLUMES

III. OPERATIONAL ANALYSIS AND SAFETY ISSUES

This chapter presents the operational analysis and safety considerations conducted for the two basic scenarios presently considered for the SR-60 corridor. Scenario 1 represents a "No-Build" scenario in which both trucks and other vehicles are accommodated in the existing "mixed-flow" lanes, while Scenario 2 provides an exclusive truck facility that runs the entire length of the study corridor. The study corridor is approximately 37 miles long and currently serves significant east-west truck traffic between the I-710 Freeway on the west, and Etiwanda Avenue (just east of the I-15 Freeway) on the east. All evaluations of the operational aspects of the two scenarios were based on the year 2020 traffic volume forecasts provided by SCAG's Heavy Duty Truck (HDT) model.

OPERATIONAL ANALYSIS METHODOLOGY

The evaluation of each scenario began by segmenting the freeway into sub-sections that have similar characteristics along their individual lengths. Criteria for selecting mainline segments included traffic volume, truck volume, grades, number of lanes, and interchange density. These same segments were also used to analyze other aspects of this project. For the evaluation of the performance of the truck facility, a different segmentation was used which consisted of sub-sections equivalent to segments between the truck facility access ramps. This same scheme was used to determine the user-fee revenue of the facility as explained in detail in the next chapter. Once the segments were established, processing of freeway components began with "Basic Freeway Sections", followed by "Ramps", and concluded with consideration of "Weaving Analysis". The operational analysis was conducted using the Highway Capacity Software (HCS Release 3), which implements the analysis procedures described in the 1997 Update to the Highway Capacity Manual (HCM).

The HCM (also known as Transportation Research Board Special Report 209) is the recognized authority in the formulation of analyses for various categories of roadways.

For many years, the HCM has provided the technical information and procedures necessary to determine the quality of operation, referred to as "Level of Service" (LOS), for freeways and other roadways. Various assumptions and variables are necessary to run the HCS successfully, and these variables must accurately reflect the features of the roadway that affect operations. One of the critical variables required, related specifically to trucks and other large vehicles, is known as passenger car equivalents (PCE).

Passenger Car Equivalents

The HCM defines PCE as "The number of passenger cars that are displaced by a single heavy vehicle of a particular type under prevailing roadway, traffic, and control conditions". Reasons PCE's are critical in this analysis include the fact that trucks are larger and have different operating characteristics compared to cars, and the Scenario 2 proposal includes a facility that is designed for 100 percent trucks. However, neither the current version nor the upcoming HCM 2000 provides for the analysis of a facility with more than 25 percent truck traffic.

Because the HCM procedures included PCE values only up to 25 percent, an alternate traffic simulation software, CORSIM, was used to develop PCE factors for controlled access facilities carrying 100 percent truck traffic, such as the proposed SR-60 truck lanes. CORSIM is a Federal Highway Administration (FHWA) corridor microscopic simulation model that simulates traffic networks by moving individual vehicles through a combined surface street and freeway network.

For validation purposes, the PCE values obtained from the CORSIM simulation were compared to PCE values from recent research on PCE by Penn State and to the 1997 HCM values for various truck percentages and "Specific Upgrades". Based on these findings and all other available information, it was concluded that PCE values for the SR-60 corridor study should be 1.5 for flat segments, and 3.0 for rolling segments.

BASIC FREEWAY SEGMENT ANALYSIS

To perform the "Basic Freeway Segment Analysis", the year 2020 forecast daily traffic volumes provided by SCAG had to be converted to "peak hour" volumes. This task was accomplished by assuming that the peak hour traffic represented approximately 16 percent of the daily traffic at the two terminus segments of the study corridor (at the I-710 and the 1-15), and 11 percent elsewhere in the corridor. These percentages were derived by comparing existing peak hour counts with the existing daily volumes provided by SCAG. Other input required to perform this analysis included terrain type (level or rolling), PCE's (as discussed in the previous section), driver population, free flow speed (assumed to be 70 mph for all segments), lane widths, and shoulder clearance. The target design operational level for all mainline segments was chosen by Caltrans as Level of Service F (0). Table 6 provides a description of the different levels of service.

The basic freeway segment analysis determined the number of lanes required to meet Level of Service F (0) operations in the mixed-flow lanes of the SR-60, both without and with the addition of the proposed truck lanes. Table 7 summarizes the results of the mainline freeway analysis for the "No-Build" scenario, while Table 8 shows the results of the mainline analysis including the exclusive truck lanes. Comparing the number of lanes required for the "No-Build" scenario to the total number of mixed-flow lanes required under the scenario with the truck lanes is helpful in evaluating the feasibility of separate truck facilities. This comparison shows that the total number of mixed-flow lanes required for the "with exclusive truck lanes" scenario is always smaller than for the "mixed-flow" scenario. Additionally, as illustrated in Tables 7 and 8, the current number of lanes provided on the SR-60 would not be sufficient to allow the facility to operate at LOS F (0) at most locations. In other words, the SR-60 would be predicted to operate at unacceptable levels of service in the year 2020 in a "mixed-flow" operation. Once the exclusive truck facility is implemented, it will alleviate some of the burden from the mixed-flow lanes, but additional mixed-flow lanes will still be necessary for the SR-60 to operate at LOS F (0). However, as summarized in Table 9, the same analysis shows that on the exclusive truck facility, which contains two lanes per direction as noted previously, the LOS ranged from LOS C to LOS E on the basic segments, with the majority of the segments operating in the LOS C to LOS D range.

TABLE 5.3
LEVEL OF SERVICE DEFINITIONS FOR FREEWAYS AND EXPRESSWAYS

Level of Service	Volume/Capacity Ratio	Average Speed (mph)	Hours of Congestion	Flow Description
A	0.00 - 0.35	≥ 60	--	Level A describes primarily free-flow conditions.
B	0.36 - 0.54	≥ 57	--	Level B represents stable, unconstrained flow.
C	0.55 - 0.77	≥ 54	--	Level C also represents stable flow with vehicular interference.
D	0.78 - 0.93	≥ 46	--	Level D borders on unstable flow with platooning occurring.
E	0.93 - 1.00	≥ 30	--	Level E describes operation at capacity. Operations at this level are extremely unstable with queuing occurring.
F0	1.01 – 1.25	≤ 29	0 - 1	Level F describes forced or breakdown flow.
F1	1.26 – 1.35	≤ 26	1- 2	Level F describes forced or breakdown flow.
F2	1.36 – 1.45	≤ 23	2 - 3	Level F describes forced or breakdown flow.
F3	>1.46	≤ 23	2 - 3	Level F describes forced or breakdown flow

Source: Caltrans HIghway Capacity Manual & District. Design speed 70 MPH.

TABLE 5.4
MAINLINE FREEWAY OPERATION ANALYSIS
MIXED FLOW LANES - NO-BUILD SCENARIO

Freeway	Segment	Direction	Average Speed (mph)	Average Daily Traffic (vph)	Service Flow Rate (pcph)	Required No. of Lanes at LOS F(0)	Existing No. of Lanes
I.	I-710 to Vail	Eastbound	57.2	132,000	27,690	10	4~5
		Westbound	59.9	138,000	28,950	10	4~5
II.	Vail to Santa Anita	Eastbound	60.7	133,000	19,510	7	4~5
		Westbound	58.8	135,000	20,130	7	4~5
III.	Santa Anita to 7th	Eastbound	58.5	154,000	22,590	8	5
		Westbound	58.0	155,000	22,735	8	5
IV.	7th to Fullerton	Eastbound	59.6	135,000	20,130	7	4~5
		Westbound	58.0	134,000	29,930	10	4~5
V.	Fullerton to Grand	Eastbound	59.2	171,000	24,660	9	4~5
		Westbound	55.9	178,000	25,670	9	4~5
VI.	Grand to Reservoir	Eastbound	54.8	169,000	24,375	9	4
		Westbound	52.6	175,000	25,240	9	4
VII.	Reservoir to Euclid	Eastbound	54.1	137,000	26,125	9	4
		Westbound	54.1	141,000	26,125	9	4
VIII.	Euclid to I-15	Eastbound	57.5	140,000	27,255	9	4
		Westbound	56.6	154,000	29,540	10	4

TABLE 5.5

MAINLINE FREEWAY OPERATION ANALYSIS
MIXED FLOW LANES - EXCLUSIVE TRUCK LANES SCENARIO

	Freeway Segment	Direction	Average Speed (mph)	Average Daily Traffic (vph)	Service Flow Rate (pcph)	Required No. of Lanes at LOS F(0)	Existing No. of Lanes
I.	I-710 to Vail	Eastbound	57.4	125,000	25,335	9	4~5
		Westbound	59.7	130,000	26,810	9	4~5
II.	Vail to Santa Anita	Eastbound	59.2	125,300	17,765	6	4~5
		Westbound	58.6	126,500	17,935	6	4~5
III.	Santa Anita to 7th	Eastbound	59.2	144,400	20,120	7	5
		Westbound	59.4	144,000	20,065	7	5
IV.	7th to Fullerton	Eastbound	60.0	125,400	17,780	6	4~5
		Westbound	61.2	123,000	17,440	6	4~5
V.	Fullerton to Grand	Eastbound	61.5	161,300	21,685	8	4~5
		Westbound	58.1	166,700	22,820	8	4~5
VI.	Grand to Reservoir	Eastbound	56.3	157,400	21,545	7	4
		Westbound	54.3	163,300	22,355	8	4
VII.	Reservoir to Euclid	Eastbound	55.5	127,100	16,390	6	4
		Westbound	62.7	130,700	16,775	6	4
VIII.	Euclid to I-15	Eastbound	59.9	128,800	24,500	8	4
		Westbound	60.3	140,800	26,535	9	4

TABLE 5.6

TRUCK LANES - EXCLUSIVE TRUCK LANES SCENARIO

Freeway Segment	Direction	Average Speed (mph)	No. of Lanes	Level of Service
I-710 to Atlantic	Eastbound	64.7	2	D
	Westbound	64.9	2	C
Atlantic to Paramount	Eastbound	65.5	2	C
	Westbound	65.0	2	C
Paramount to Rosemead	Eastbound	65.5	2	C
	Westbound	64.8	2	D
Rosemead to I-605	Eastbound	63.9	2	D
	Westbound	63.2	2	D
I-605 to Hacienda	Eastbound	64.2	2	D
	Westbound	61.8	2	E
Hacienda to Fullerton	Eastbound	64.5	2	D
	Westbound	62.1	2	E
Fullerton to Fairway	Eastbound	64.0	2	D
	Westbound	60.9	2	E
Fairway to SR-57(S)	Eastbound	64.7	2	D
	Westbound	63.7	2	D
SR-57(S) to SR-57(N)	Eastbound	59.8	2	E
	Westbound	65.0	2	C
SR-57(N) to Reservoir	Eastbound	64.5	2	D
	Westbound	63.8	2	D
Reservoir to Grove	Eastbound	65.5	2	B
	Westbound	65.5	2	C
Grove to Archibald	Eastbound	64.9	2	C
	Westbound	64.2	2	D
Archibald to Milliken	Eastbound	64.9	2	C
	Westbound	64.2	2	D
Milliken to I-15	Eastbound	65.5	2	C
	Westbound	65.0	2	C

RAMP ANALYSIS

The ramp analysis used the HCS and 2020 traffic assignments from the SCAG HDT model for the "truck only" ramps, as described previously. This process excluded analyses for other ramps due to many uncertainties regarding future traffic volumes when the freeway is expanded. The primary measure of operation for these ramps is level of service based on "maximum density" within the ramp area of influence on the mainline freeway. However, consideration was also given to a secondary measure of operational effectiveness, "minimum speed". For the analyses, some values had to be assumed, such as ramp acceleration and deceleration lengths, which were based on initial lengths of 500 feet. Another assumed input value was the free-flow speed, which was determined for each ramp based on its geometries (see Chapter 3 for geometric details). Table 10 and Figure 16 show the results of this analysis. From an examination of the results, it can be seen that 10 ramps are operating at LOS F based on "maximum density". Level of service could be improved somewhat at some ramps based on the secondary indicator of "minimum speed" by increasing acceleration or deceleration lengths. However, the worst result occurred at the southbound SR-57 to westbound SR-60 ramp, which will operate at LOS F due to high volumes. Increasing the acceleration length of this ramp from the assumed 500 feet will not significantly improve the operations of the ramp.

WEAVING ANALYSIS

At the feasibility stage of this project, a quantitative weaving analysis is not practical since it requires extremely detailed future assignments and geometric design. Consequently, only a qualitative analysis is presented in this report. As more of the detailed design work is carried out nearer the construction stage, the quantitative analysis will become more urgent. Regarding the mixed-flow freeway mainline, it is expected that fewer trucks need to be considered in the weaving analysis, because a substantial number of trucks will be diverted to the proposed truck lane facility. Therefore, the weaving activity for the mixed-flow traffic is anticipated to improve compared to today's level of service. On the other hand, higher weaving flows for trucks are anticipated to occur at interchanges containing the truck facility access points.

TABLE 5.7
RAMPS OPERATIONAL ANALYSIS

Interchange	Ramp	No. of Lanes	Level of Service *
I-710	NB I-710 to EB SR-60	2	F
	WB SR-60 to SB I-710	2	B
Atlantic Boulevard	Eastbound off-ramp	1	C
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	C
	Westbound on-ramp	1	D
Paramount Boulevard	Eastbound off-ramp	1	C
	Eastbound on-ramp	1	C
	Westbound off-ramp	1	C
	Westbound on-ramp	1	C
Rosemead Boulevard	Eastbound off-ramp	1	C
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	D
	Westbound on-ramp	1	D
I-605	NB I-605 to EB SR-60	2	F
	EB SR-60 to NB I-605	2	B
	SB I-605 to WB SR-60	2	F
	SR-60 WB to I-605 SB	2	C
Hacienda Boulevard	Eastbound off-ramp	1	D
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	D
	Westbound on-ramp	1	F
Fullerton Road	Eastbound off-ramp	1	D
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	E
	Westbound on-ramp	1	F
Fairway Drive	Eastbound off-ramp	1	D
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	D
	Westbound on-ramp	1	D
SR-57 South	NB SR-57 to EB SR-60	1	F
	WB SR-60 to SB SR-57	1	F
SR-57 North	EB SR-60 to NB SR-57	1	F
	SB SR-57 to WB SR-60	1	F**
Reservoir Street	Eastbound off-ramp	1	D
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	B
	Westbound on-ramp	1	B
Archibald Avenue	Eastbound off-ramp	1	B
	Eastbound on-ramp	1	B
	Westbound off-ramp	1	D
	Westbound on-ramp	1	D
Grove Avenue	Eastbound off-ramp	1	C
	Eastbound on-ramp	1	D
	Westbound off-ramp	1	D
	Westbound on-ramp	1	D
Milliken Avenue	Westbound on-ramp	1	D
I-15	EB SR-60 to NB I-15	2	A
	EB SR-60 to SB I-15	2	A
	NB I-15 to WB SR-60	2	F
	SB I-15 to WB SR-60	2	C

Notes:
* Primary measure is amximum density; secondary measure is minimum speed
** Both maximum density and minimum speed were within LOS F

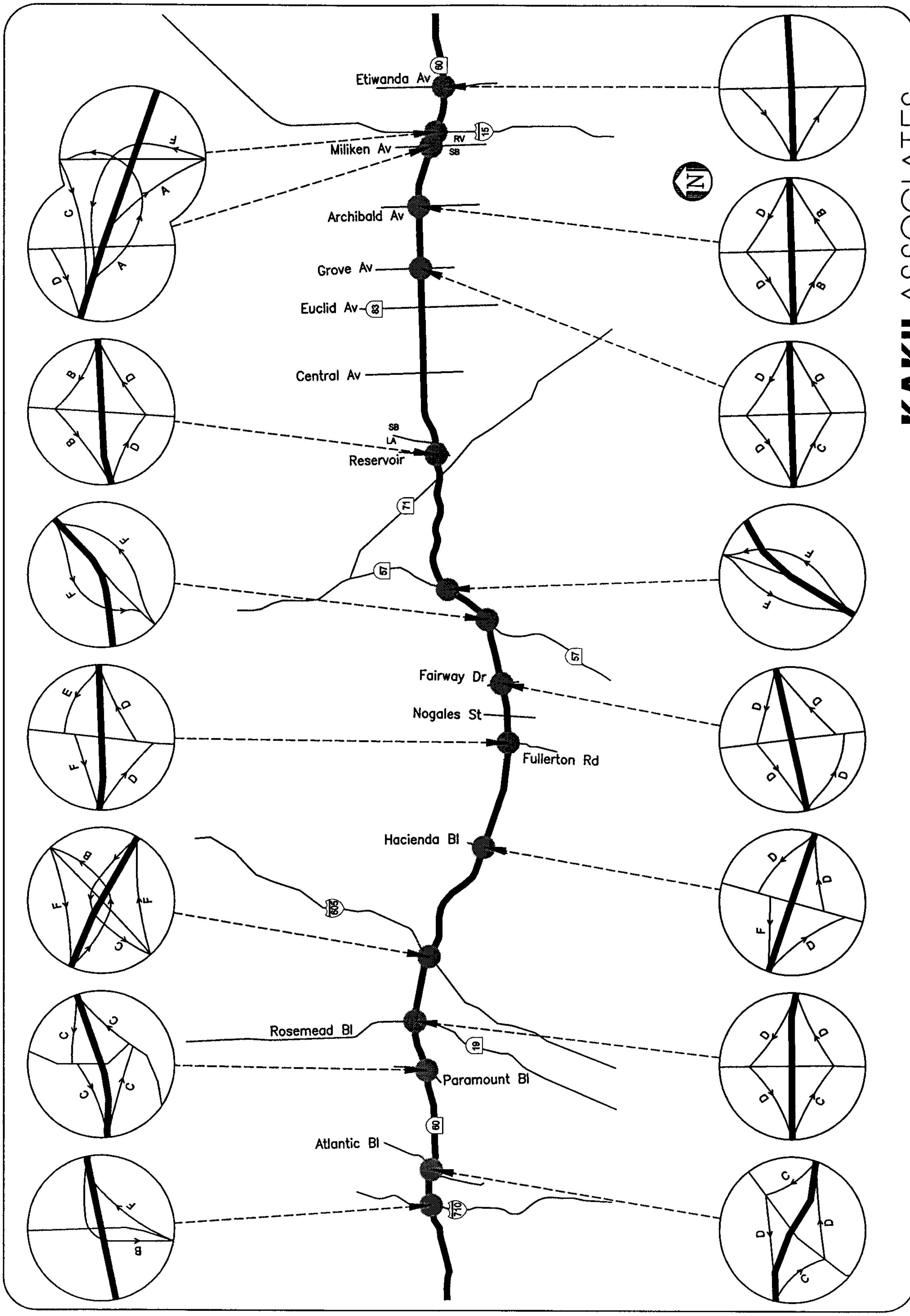

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Figure 5.6
RAMPS OPERATIONAL ANALYSIS - LEVEL OF SERVICE

Therefore, these ramps must be designed accordingly to accommodate this greater demand. When weaving distances of 2,500 feet or greater are provided, the HCM weaving analysis does not typically indicate deficiencies. The truck interchanges in the proposed truck facility are spaced at sufficient intervals so as to adequately accommodate the exclusive facility's mainline truck weaving activities without anticipating significant difficulties

SAFETY CONSIDERATIONS

Safety is the single most important consideration in determining the feasibility of exclusive truck lanes. As presented earlier in Task 3 - Data Collection, an analysis was conducted to identify the recent accident history of heavy-duty trucks on the SR-60 corridor. This analysis was based on local safety databases such as the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) for Los Angeles County accident data (see Table 8), the California Urban Freeway Gridlock Study prepared by Caltrans in 1988 (see Table 9), and the Incident Reporting System maintained by Caltrans for San Bernardino and Riverside counties accident data (see Table 10) among others. For a detailed discussion on these results refer to the Task 3 Report.

Research has shown that in crashes involving large trucks, occupants of smaller vehicles are much more likely to sustain injury and death than truck occupants. The disparity in vehicle size and weight is a primary contributor to severity in these crashes. Garber and Joshua[1] found that when large trucks are involved in fatal crashes, there were two vehicles involved in the incident 60 percent of the time. In these multi-vehicle accidents, fatalities were 40 times more likely to occur than when the crash involved only vehicles other than trucks. The authors concluded that reducing interactions between the two types of vehicles could enhance safety, and the number of fatal crashes could be reduced. Another safety consideration, especially where significant grades are involved, is the speed differentials between trucks and smaller vehicles. Dedicated truck

[1] NJ. Garber and S. Joshua, "Characteristics of Large Truck Crashes in Virginia," Transportation Quarterly, Volume 43, Number 1, Pages 123-138, Eno Foundation for Transportation, Inc., Westport, CT, 1989.

TABLE 5.8
NUMBER AND TYPE OF TRUCK ACCIDENTS IN LOS ANGELES COUNTY ON SR-60 FROM 1996 TO 1998

Year of Accident	Property Damage Only	Injury Accident	Fatal Accident	Total Accidents
1996	313	84	2	399
1997	303	87	4	394
1998	377	87	1	465
Total	993	258	7	1,258

Source: California Highway Patrol SWITRS database.

TABLE 5.9
ANNUAL TRUCK ACCIDENT RATES PER 100 MILLION VMT IN LOS ANGELES COUNTY ON SR-60 FROM 1996 TO 1998[1]

Year of Accident	SR 60 (Los Angeles County)	Urban Freeways in California[2]
1996	25	N/A
1997	25	N/A
1998	29	N/A
Average Rate	27	273

Notes:

1) Annual and average truck rates for SR 60 were based on CHP SWITRS database and Caltrans Truck Volumes for 1996, 1997, and 1998.
2) Average truck rates for urban freeways in California were based on California Urban Freeway Gridlock Study from 1988.

Sources:

- California Highway Patrol SWITRS database and Caltrans.
- Perkins, David B. *Urban Freeway Gridlock Study: Technical Memorandum 1-4.* Prepared for California Department of Transportation. Cambridge Systematics, Inc., Cambridge, Massachusetts, November 1988, Table 2.

TABLE 5.10
ANNUAL SR-60 TRUCK ACCIDENTS BY VEHICLE TYPE IN SAN BERNARDINO COUNTY ON SR-60 FOR 1997 AND 1998

Vehicle Type	Number of Accidents	Percentage of Truck Accidents
Truck/Truck Trailer	88	27.6%
Truck/Tractor & 1 Trailer	213	66.8%
Truck/Tractor & 2 Trailers	15	4.7%
Truck/Tractor & 3 Trailers	0	0.0%
Single Unit Tanker	0	0.0%
Truck/Tractor & 1 Tank Trailer	3	0.9%
Truck/Tractor & 2 Tank Trailers	0	0.0%
Total	319	100.0%

Source: Caltrans

climbing lanes reduce the problem as long as truck drivers are willing to use the designated lanes. Several studies have examined the operating characteristics of large trucks with regard to safety. A landmark study published in 1982 by Eicher et al. found that although trucks nationwide were involved in only 5.7 percent of all police-reported accidents, they accounted for 11.1 percent of all fatal crashes. These nationwide data indicated that crashes involving large trucks are more than twice as likely to result in a fatality than crashes in which they are not involves - 1.4 percent versus 0.6 percent. Finally, a large truck safety study in North Carolina found that the number of accidents involving large trucks was growing faster than crashes involving other vehicles. This study, by Council and Hall, found that trucks were involved in three times the proportion of fatal crashes than passenger vehicles.

Based on the above described accident characteristics of crashes involving heavy-duty trucks, it is reasonable to believe that the segregation between trucks and smaller vehicles, although not likely to significantly reduce the total number of accidents, should reduce the number of fatal crashes in the SR-60 corridor. This conclusion, however, cannot be verified realistically without historical data and a scientific comparison from either a "before-after" scenario or a "side-by-side" comparison of trucks only facility and mixed-flow roadways. The required data for this verification, unfortunately, is nonexistent at the present time since the few known truck facilities in the U.S. also allow smaller vehicles to travel the truck roadways. Therefore, even though concerns are being voiced nationwide regarding increases in the number of trucks and the severity of truck-involved crashes, historical evidence from actual truck facilities does not exist to scientifically support assumed reductions in crash severity when truck-only facilities are provided.

IV. CONCEPTUAL DESIGNS FOR SR-60 TRUCK LANES

This chapter describes the conceptual design alternatives for the SR-60 truck lanes, along with the design criteria and assumptions utilized to arrive at these alternatives. It also provides the methodology and assumptions used to derive the unit costs that were later used to price each of the final alternatives. All the unit costs (in 2000 $) required to appropriately price the infrastructure portion of the new facility, including roadway items (pavement, earthwork, drainage, utilities, traffic control, etc...), structure items (bridges/overpasses), and construction items (engineering, construction management), are provided in Appendix A.

As described in previous documents, this study examines the feasibility of implementing exclusive and/or mixed-flow truck lanes on the Pomona Freeway (State Route 60) along an approximately 37-mile stretch in eastern Los Angeles and western San Bernardino Counties. The project limits are the Long Beach Freeway (Interstate 710) on the west, and the Ontario Freeway (Interstate 15) on the east.

The truck lane feasibility study examined two separate alternatives, plus a third "hybrid" alternative. The first alternative considered the implementation of two additional truck lanes in each direction at grade with the existing freeway. These lanes would be added to the outside of the existing SR-60 facility. The second alternative involved the construction of elevated sections supporting two travel lanes in each direction within the median of the existing freeway. The third "hybrid" alternative considered a primarily at-grade facility with some elevated sections. This final recommended alternative evolved based primarily on right-of-way and other design factors following evaluation of the two primary alternatives. A summary of the alternatives and the key considerations for each is contained in the following sections of the report.

At-Grade Alternative

The at-grade alternative will provide two exclusive truck lanes in each direction on the SR-60 generally between the 1-710 Freeway and the 1-15 Freeway. The exclusive truck lanes will be at grade outside the existing freeway roadway, and will be separated from the mixed flow lanes by barriers. A typical cross section of the at- grade alternative is shown in Figure 6. This alternative would require additional right-of-way (ROW) acquisition along both sides of the existing SR-60. A schematic representation depicting the physical characteristics of this alternative along with its ROW acquisition requirements is presented in Figures 7a through 7j.

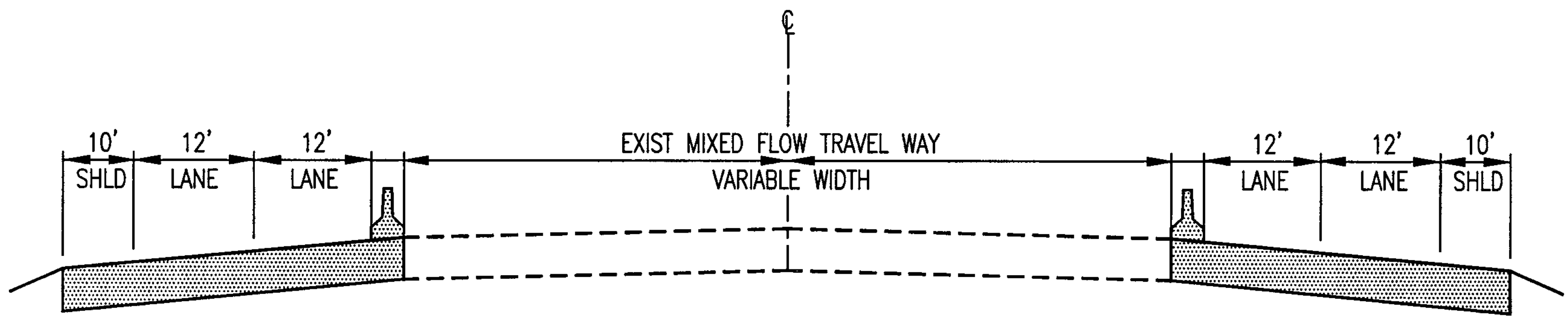
Elevated Alternative

This alternative would also provide two exclusive truck lanes in each direction within the project limits. However, this version would construct the four lanes on an elevated platform within the median of the SR-60. By design, these elevated truck lanes would segregate truck and mixed flow traffic. The typical cross section of the elevated truck lane alternative is shown in Figure 8. Since the elevated truck lanes are proposed to be constructed within the existing median island of the SR-60, this alternative would typically require no right-of-way (ROW) acquisition the only exception being in the segment between Santa Anita and 7th Avenue. A schematic representation similar to the one presented for the at-grade alternative is depicted in Figure 9 only for the segment requiring ROW acquisition to avoid redundancy.

TRUCK LANE ACCESS CONSIDERATIONS

In addition to the mainline truck travel lane considerations discussed in the preceding sections of this report, access issues between the SR-60 and other freeway and surface street facilities within the subject corridor were also investigated.

Within the segment of freeway under consideration, SR-60 interchanges with two other key regional transportation facilities, the San Gabriel River Freeway (Interstate 605) and the Orange Freeway (State Route 57). SR-60 and SR-57 share the same roadway for an approximately two-mile stretch between Brea Canyon Road and Diamond Bar



Source: HDR Engineering, Inc.

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FIGURE 5.7
ROUTE 60–TYPICAL SECTION
TRUCK LANES AT GRADE

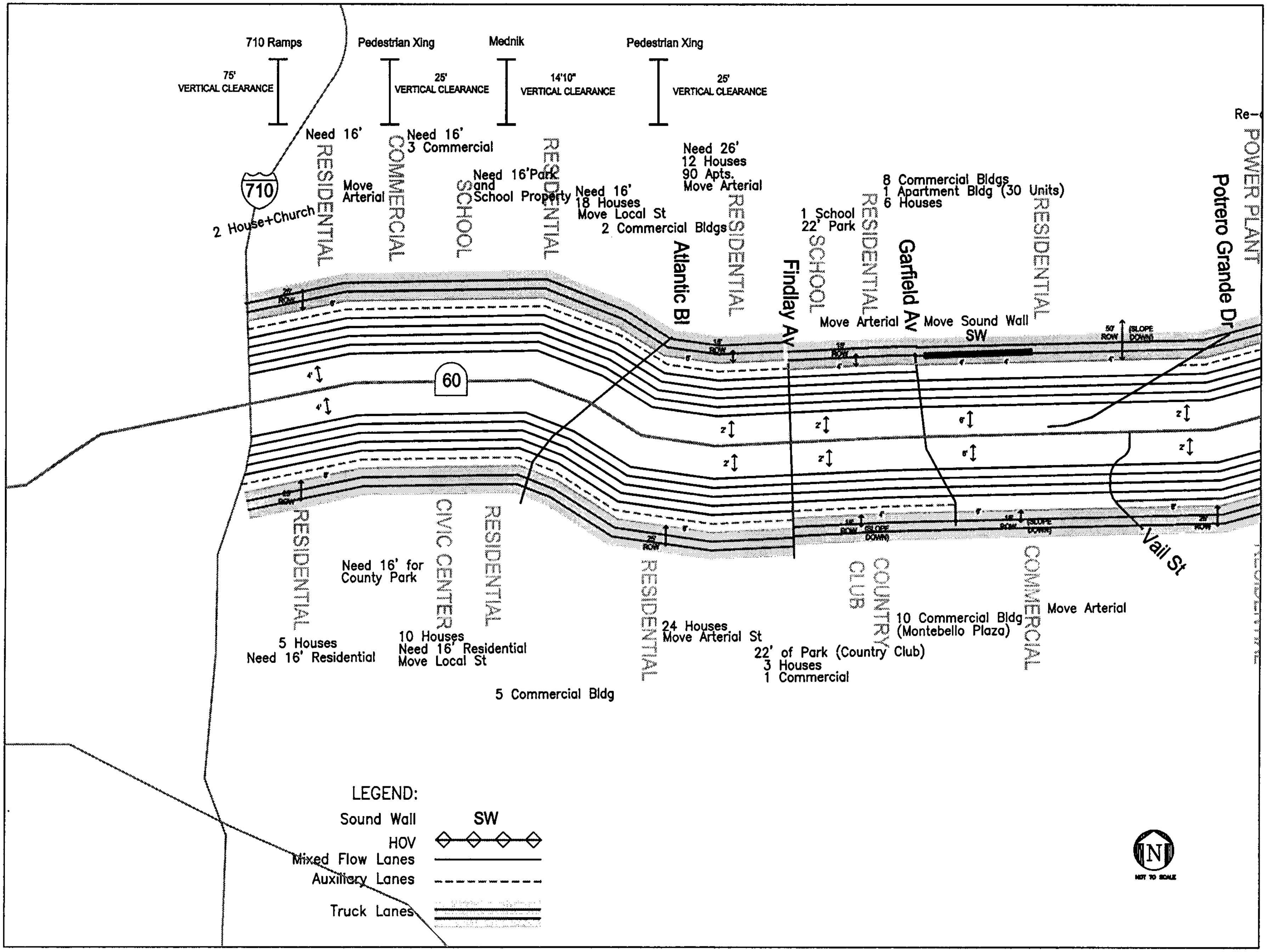


FIGURE 5.8-A

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

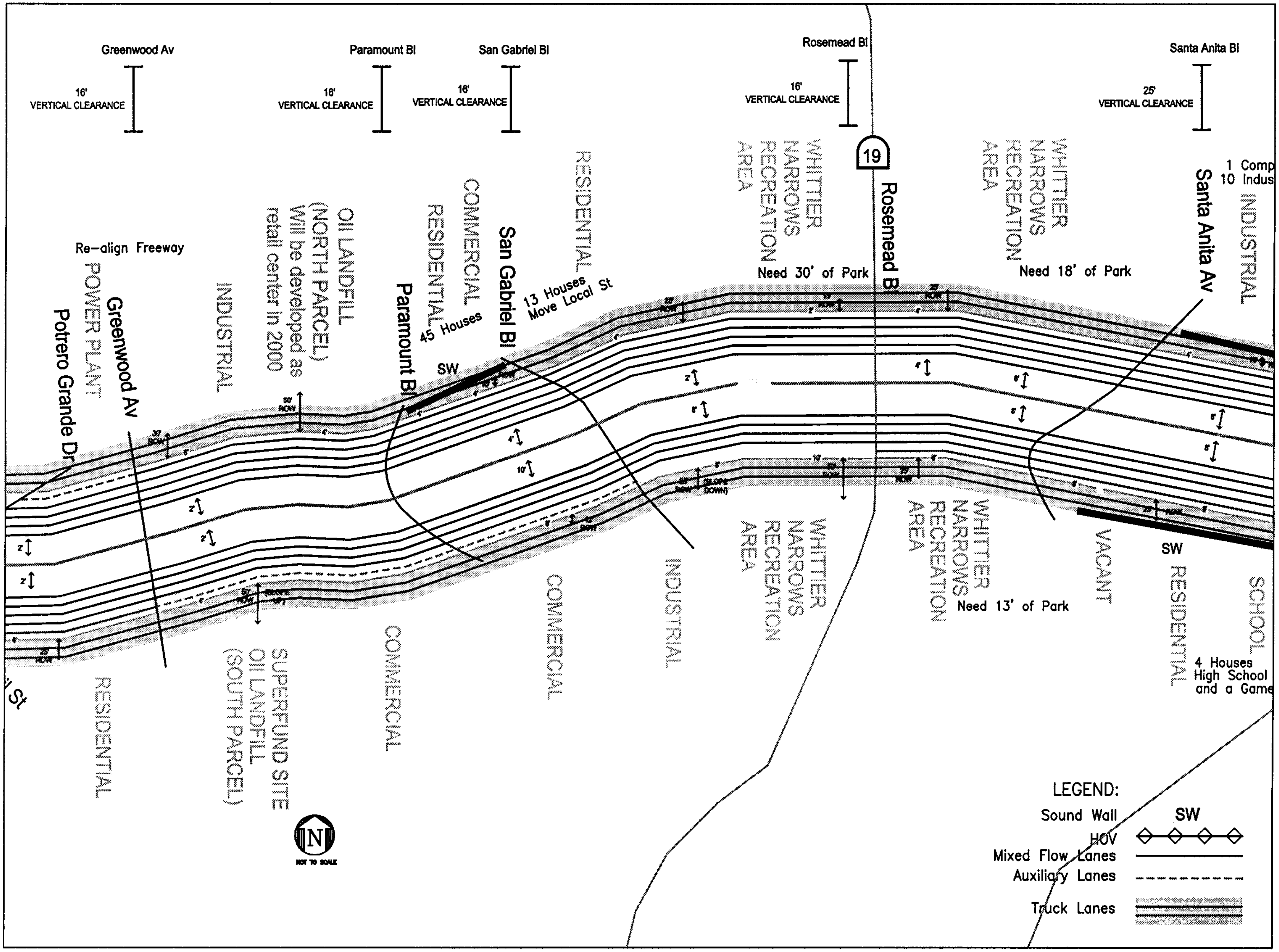


FIGURE 5.8-B

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

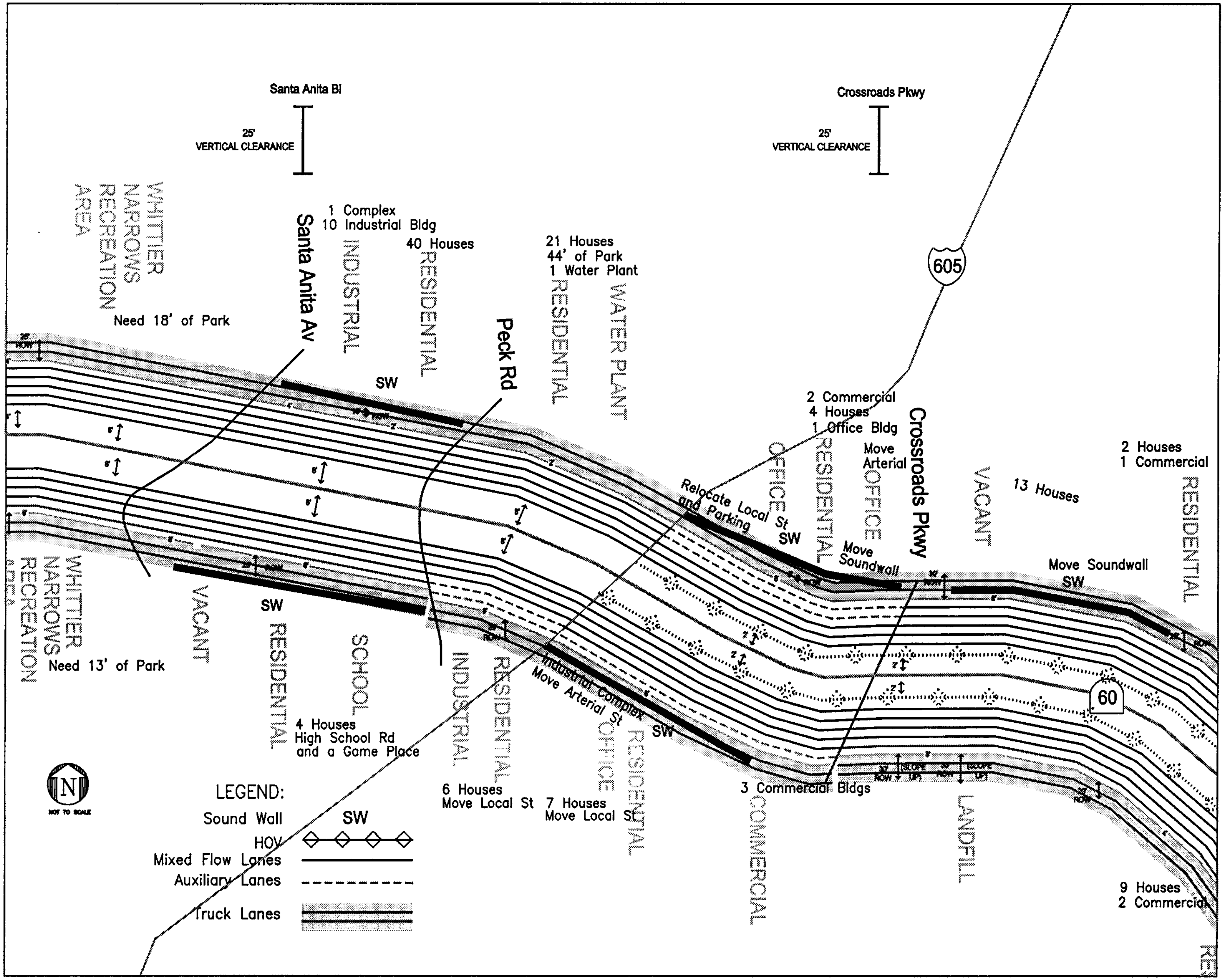


FIGURE 5.8-C
SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

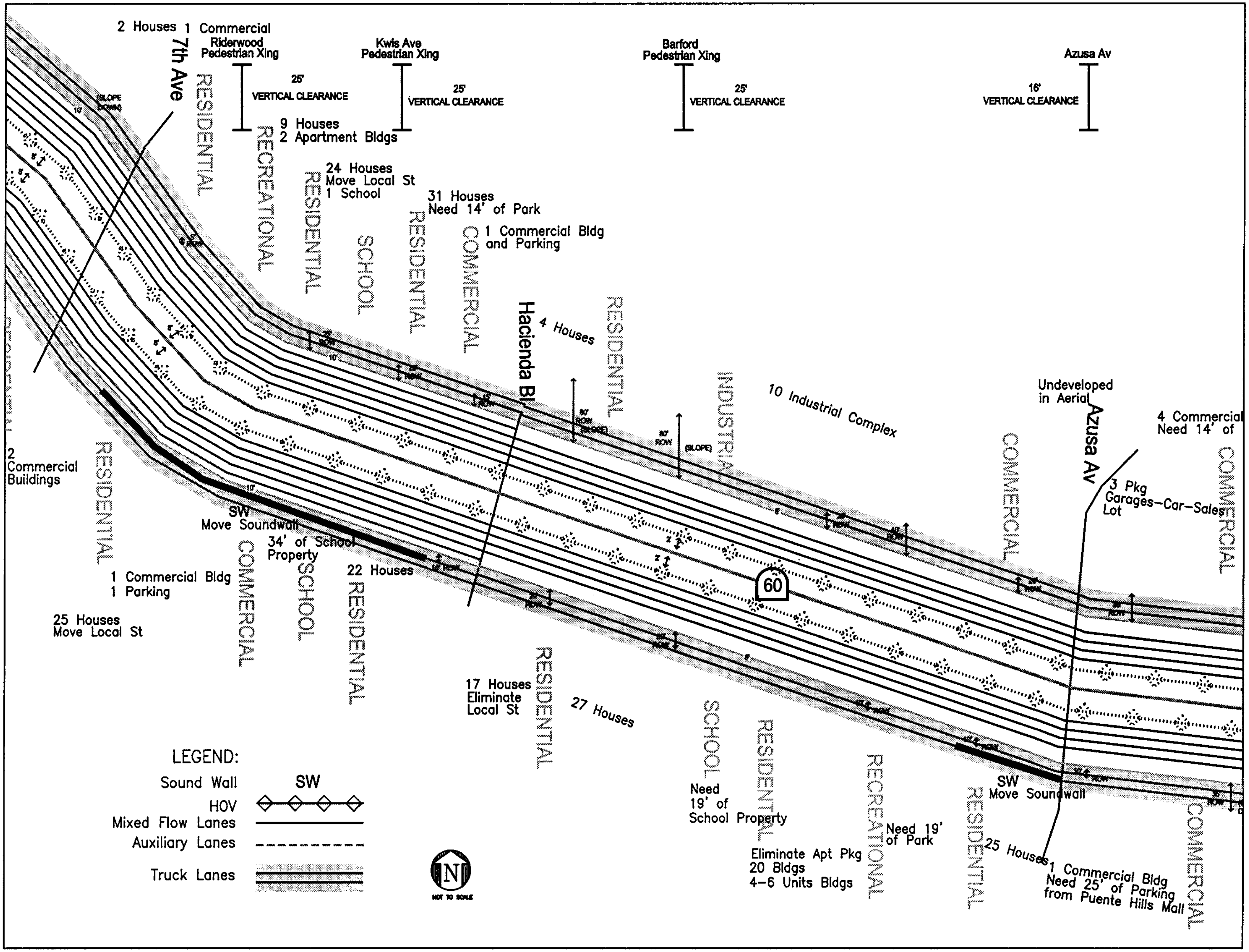


FIGURE 5.8-D

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

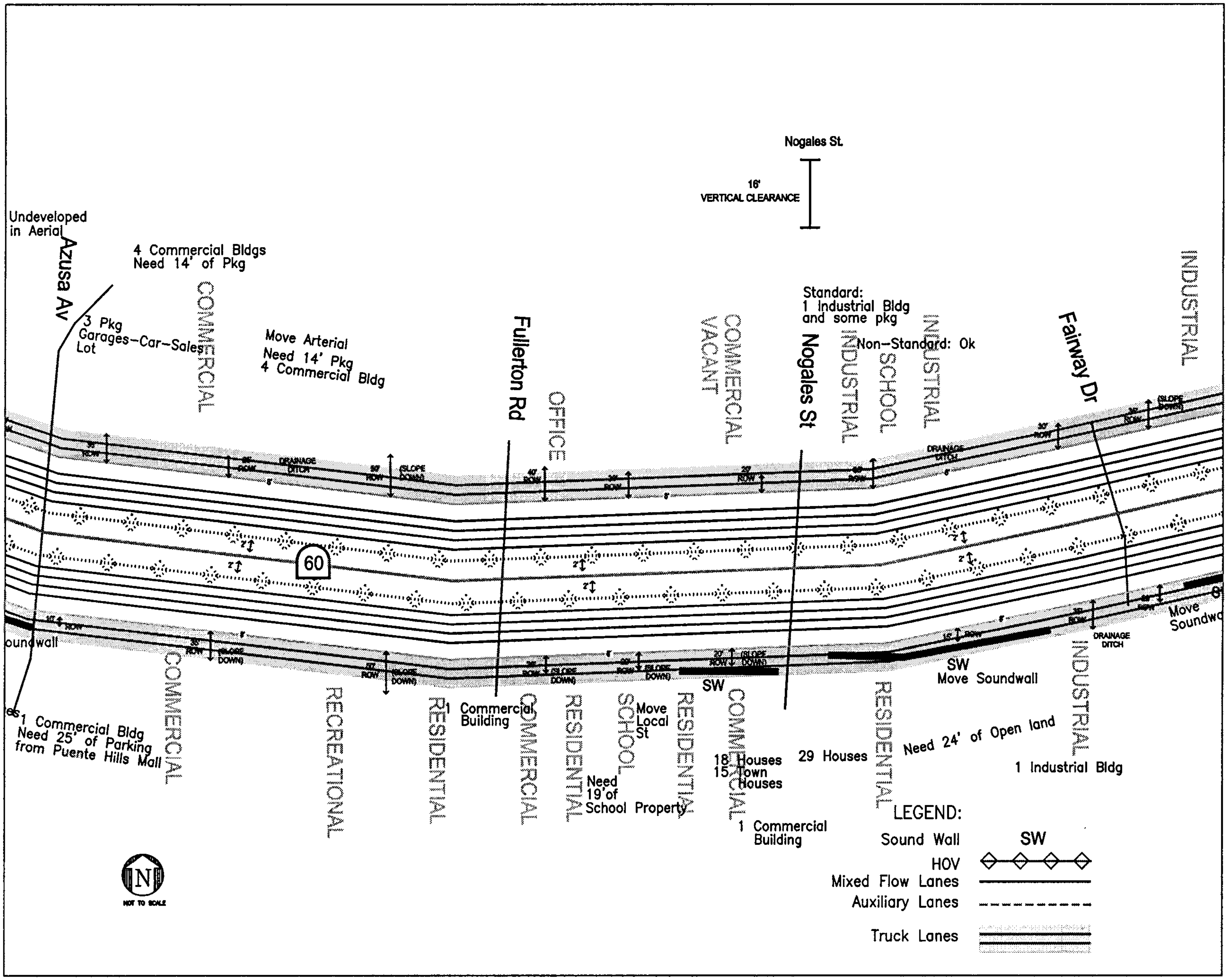


FIGURE 5.8-E

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

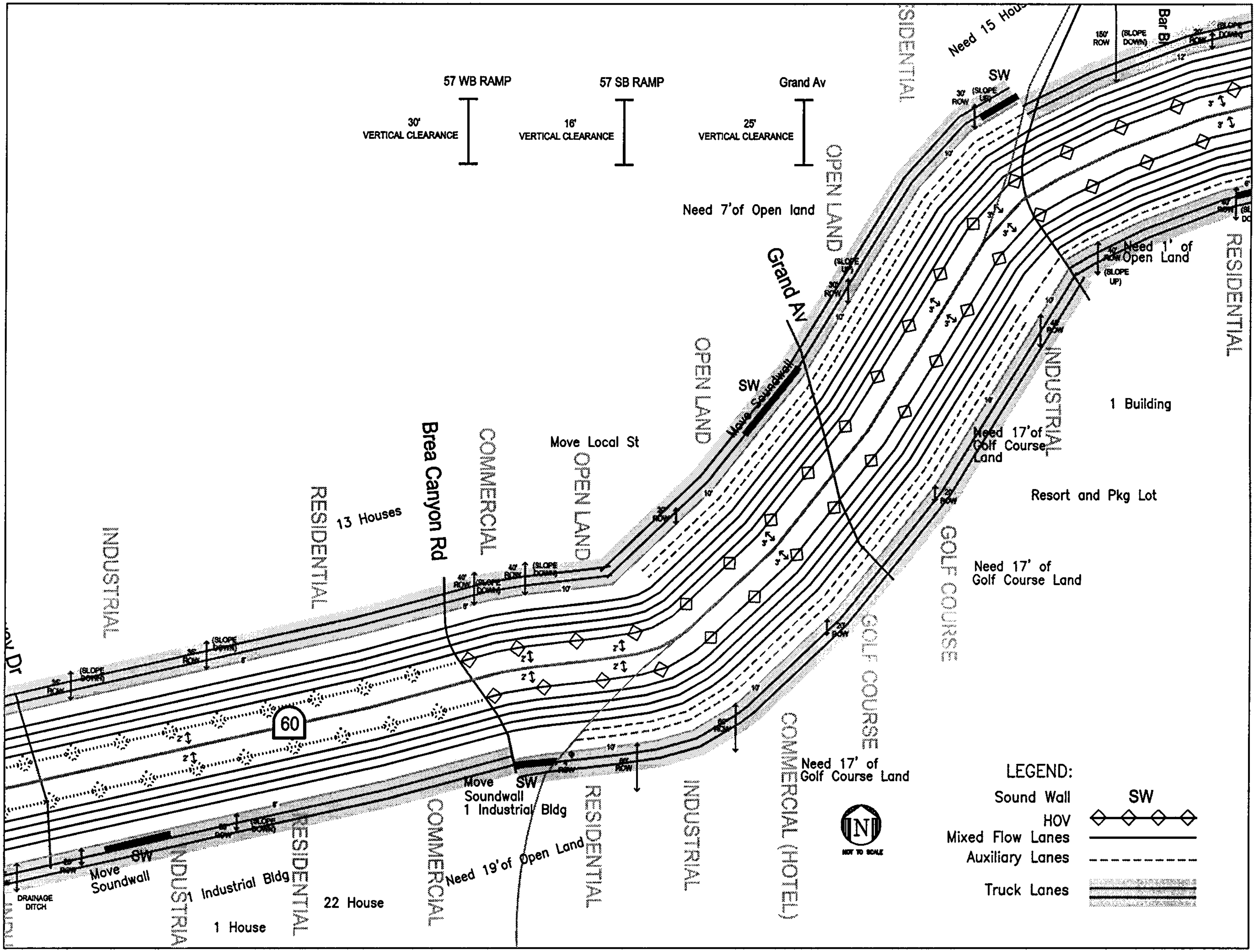


FIGURE 5.8-F

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

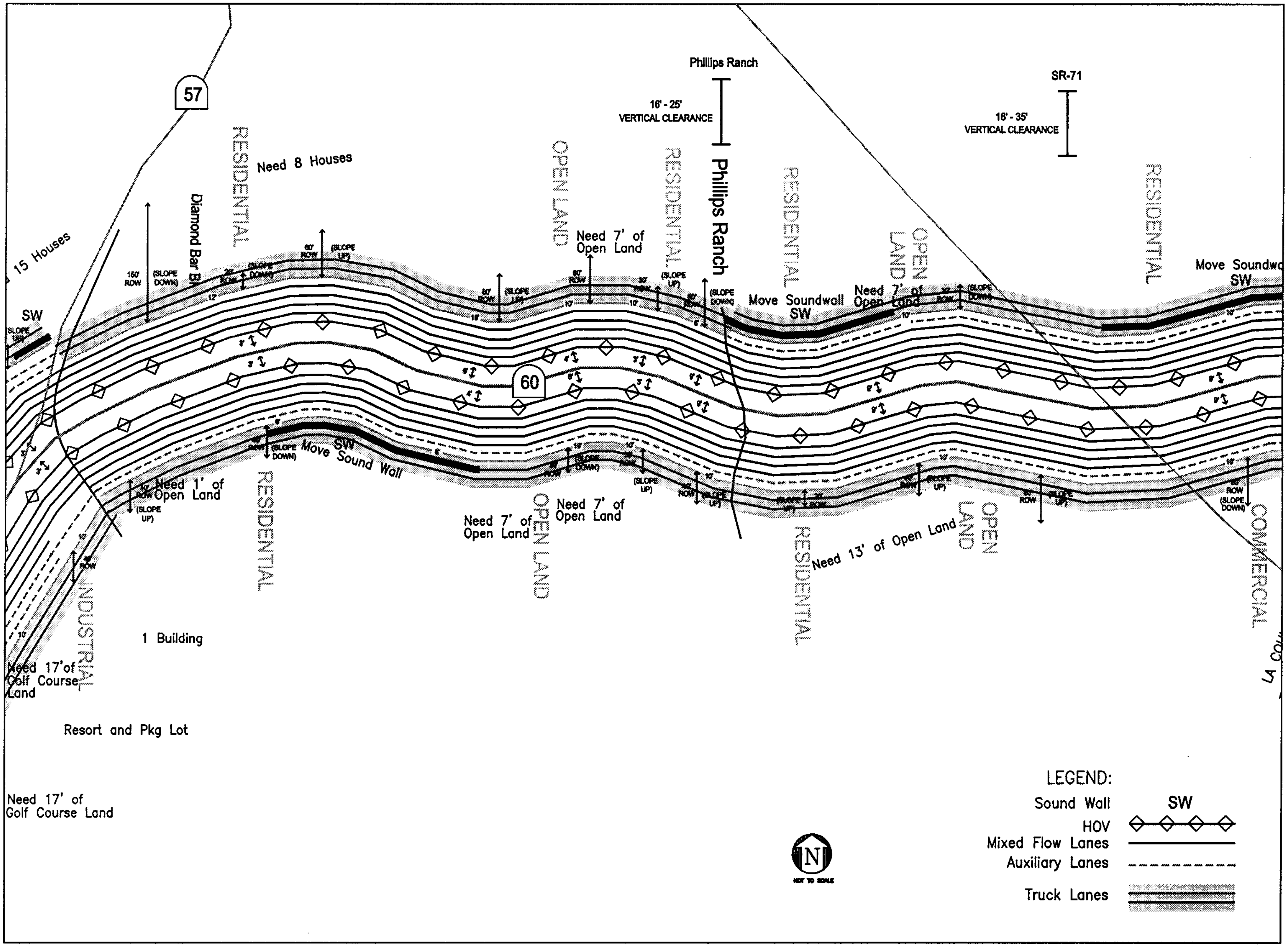


FIGURE 5.8-G

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

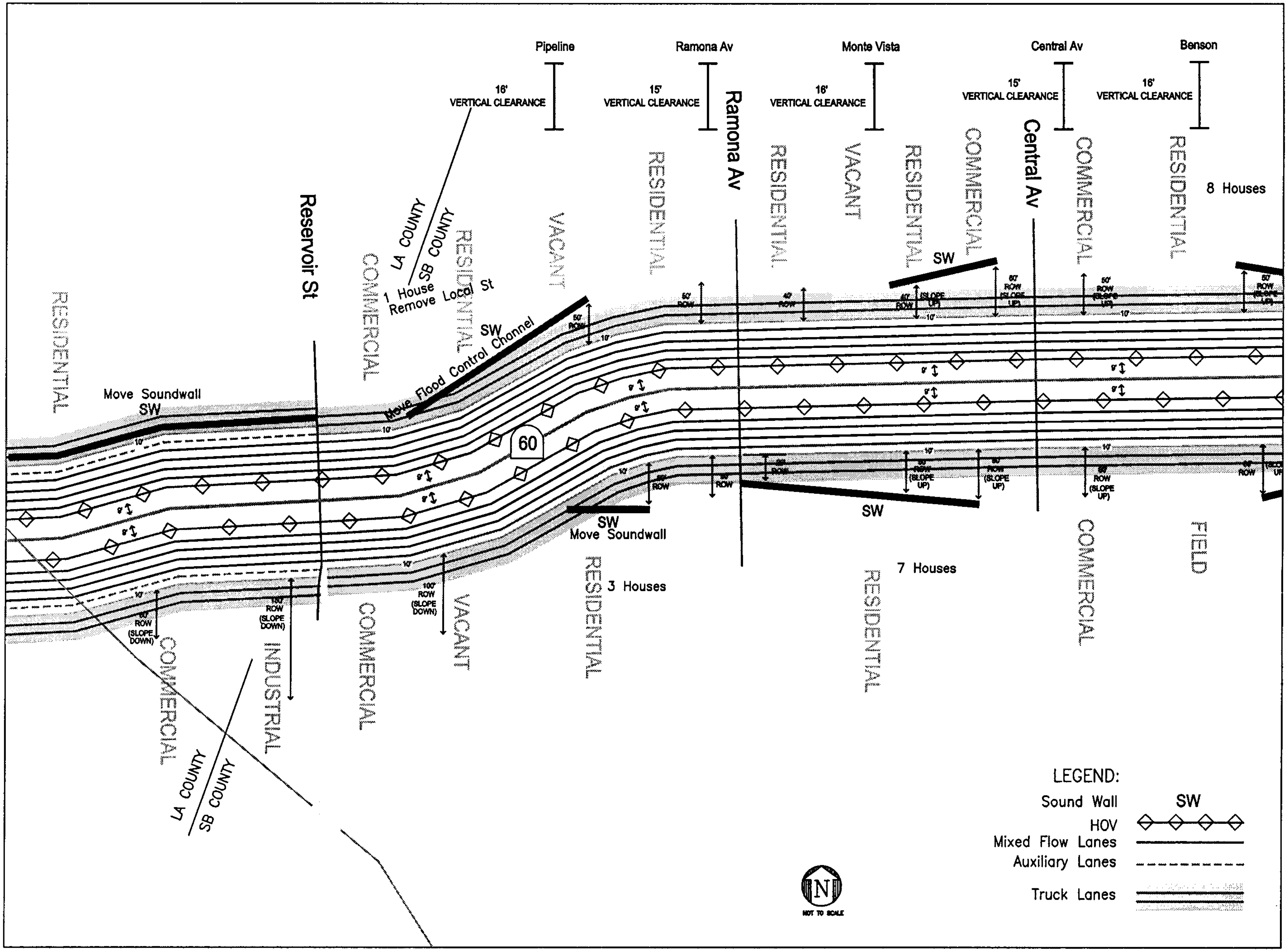


FIGURE 5.8-H
SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

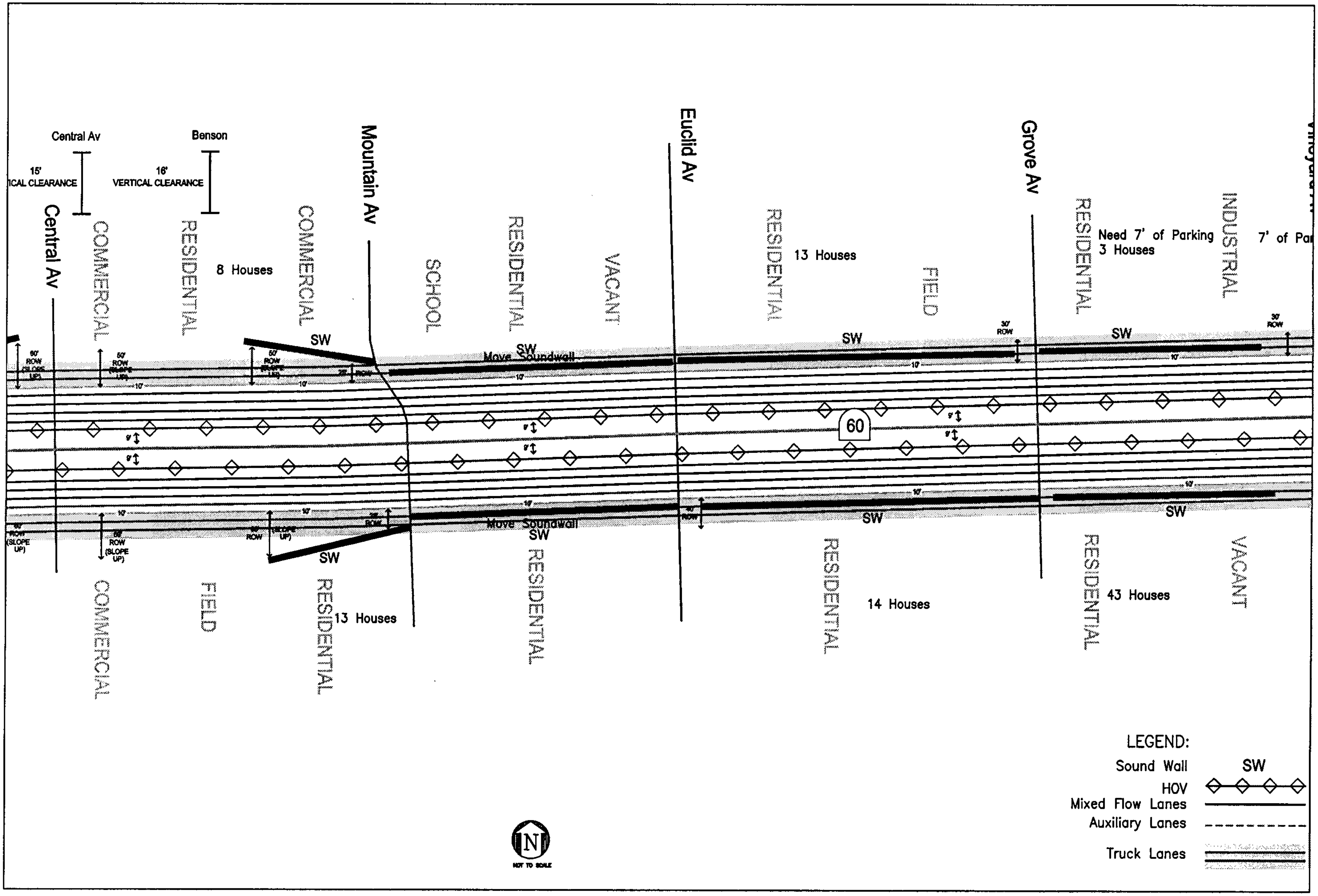


FIGURE 5.8-I
SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE

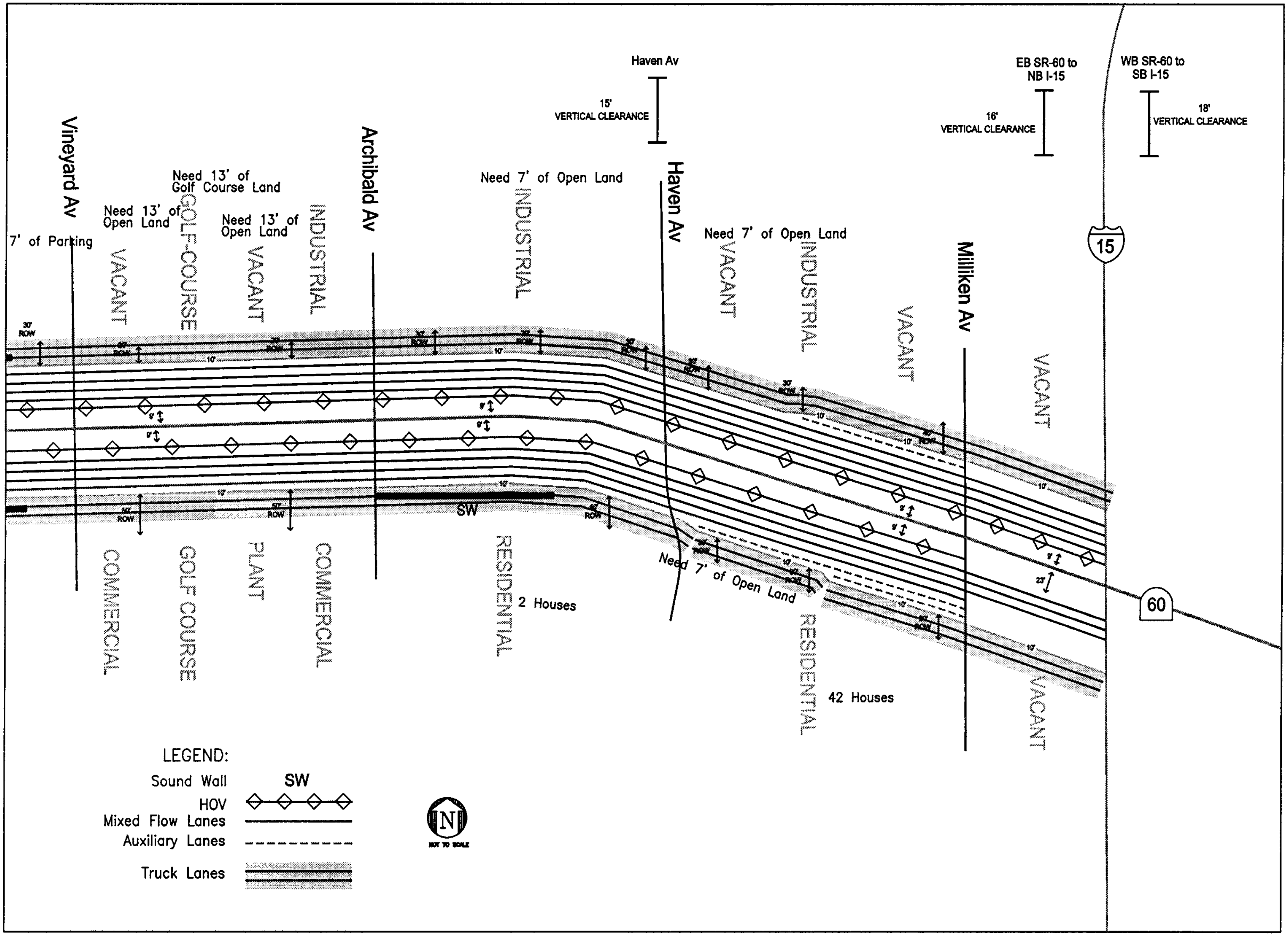
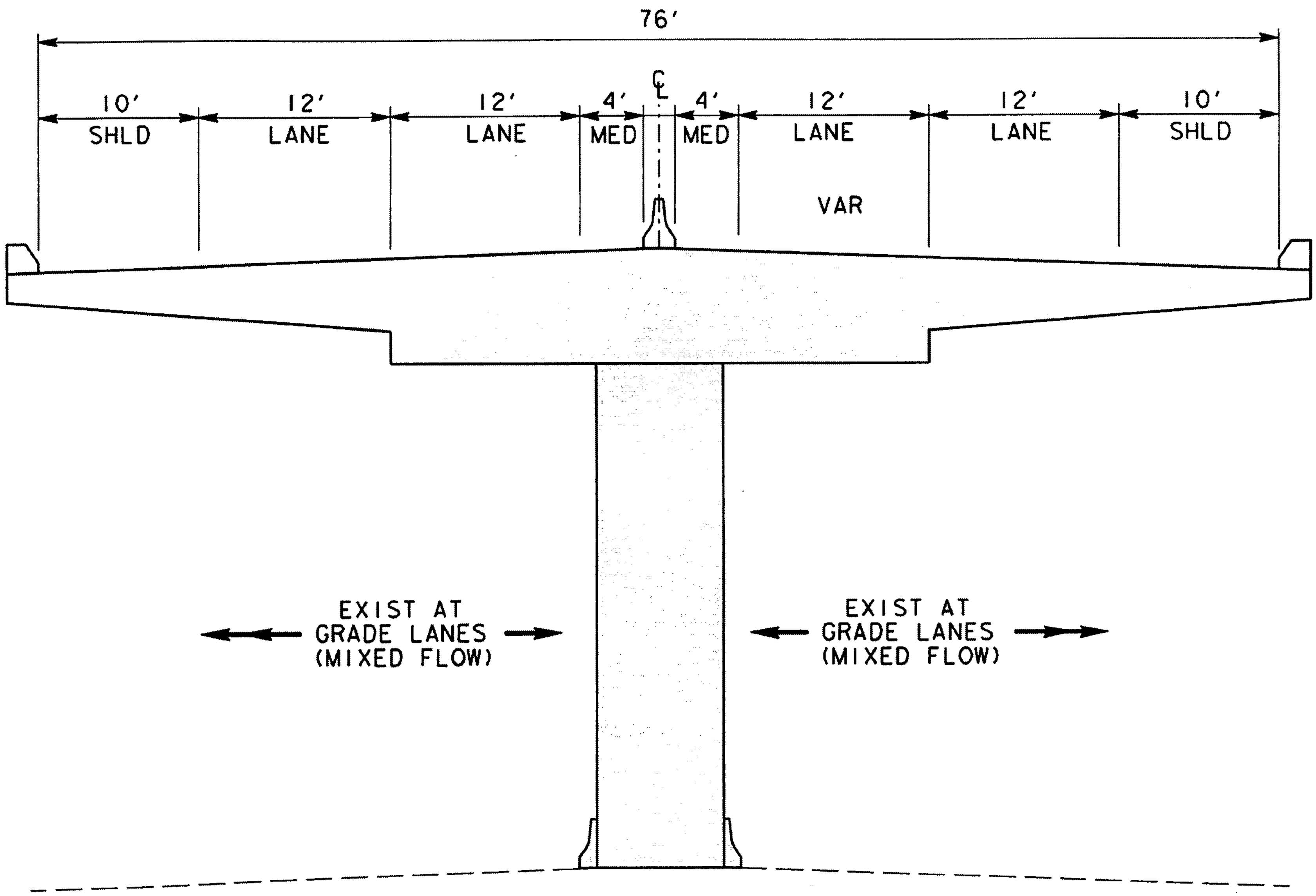


FIGURE 5.8-J

SR-60 PHYSICAL CHARACTERISTICS -- AT-GRADE ALTERNATIVE



Source: HDR Engineering, Inc.

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FIGURE 5.9
ROUTE 60–TYPICAL SECTION
ELEVATED TRUCK LANES

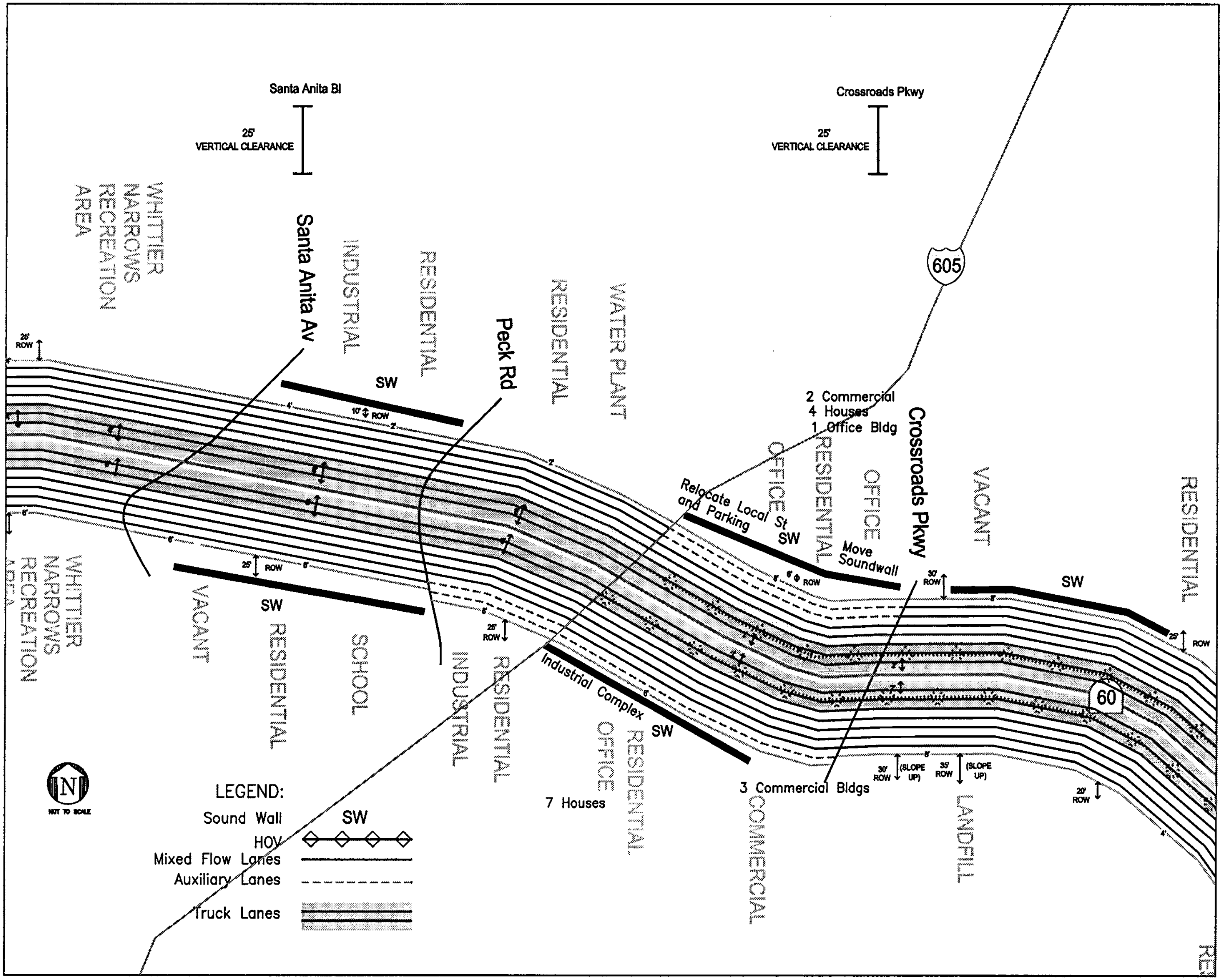

FIGURE 5.10

SR-60 PHYSICAL CHARACTERISTICS -- AERIAL STRUCTURE ALTERNATIVE

Boulevard along the west side of the City of Diamond Bar. Freeway-to-freeway truck traffic connectors were analyzed at each of the following interchanges:

Freeway-to-Freeway Connectors

- SR-60/1-710
- SR-60/I-605
- SR-60/SR-57 (Both north and south interchanges)
- SR-60/1-15

The SR-60 also crosses numerous surface streets, and provides interchanges with many of the key roadways. Each of these roadways was evaluated for importance with respect to truck traffic (See Task 4 Report) to ensure that appropriate truck access to the freeway was provided. A review of this data indicated that truck ramps should be provided at the following freeway-to arterial street interchanges:

Surface Street Truck Access Ramps

- Atlantic Boulevard
- Paramount Boulevard
- Rosemead Boulevard
- Hacienda Boulevard
- Fullerton Road
- Fairway Drive
- Reservoir Street
- Grove Avenue
- Archibald Avenue
- Milliken Avenue
- Etiwanda Avenue

Figure 10 illustrates all the locations where access to the truck facility would be provided.

Ramp and Freeway Connector Alternatives Considered

Two alternatives were considered for the freeway-to-freeway truck connections. These alternatives were called the "high" and "low" options. The "high option" provides an

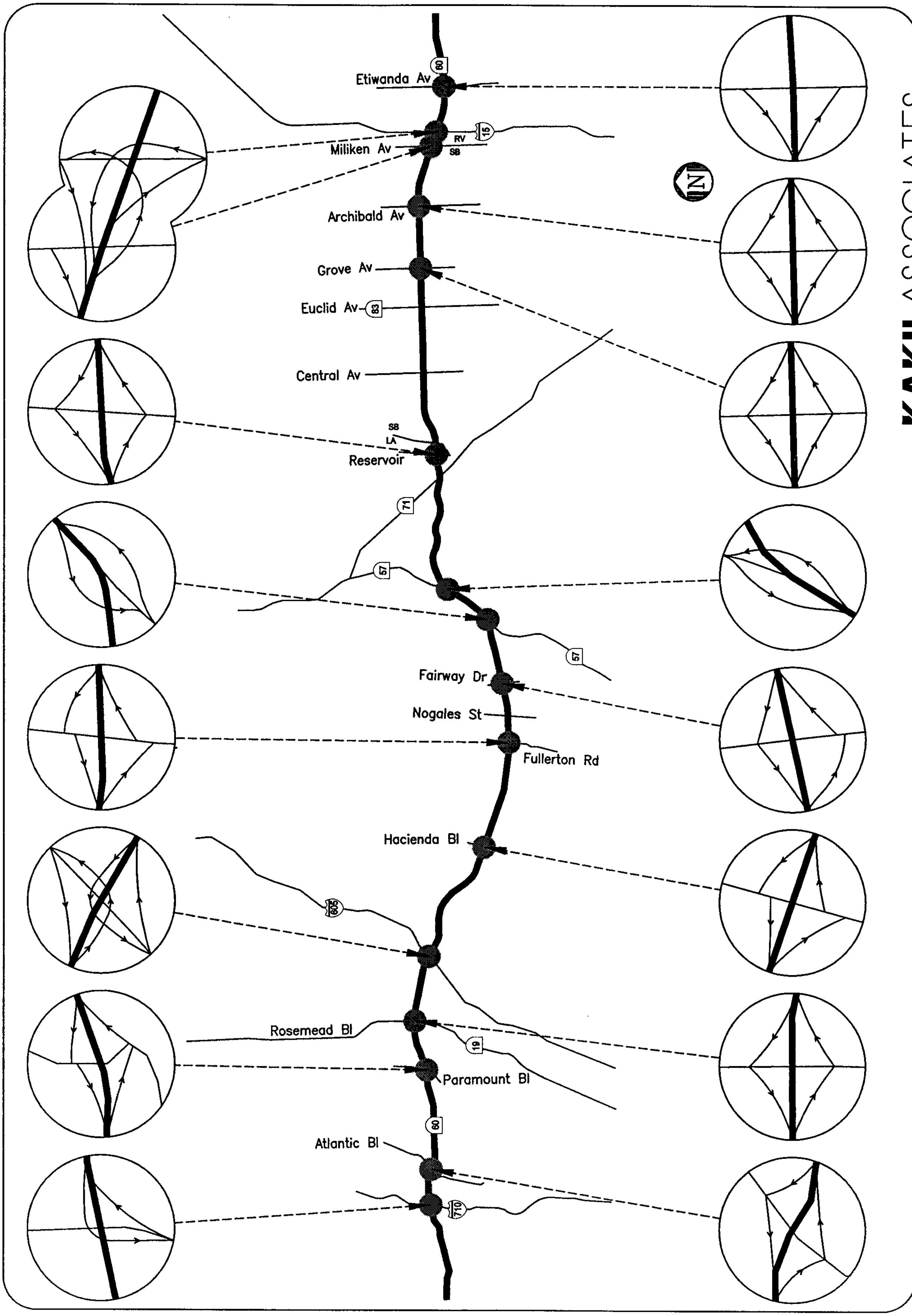

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FIGURE 5.11
TRUCK LANES ACCESS LOCATIONS

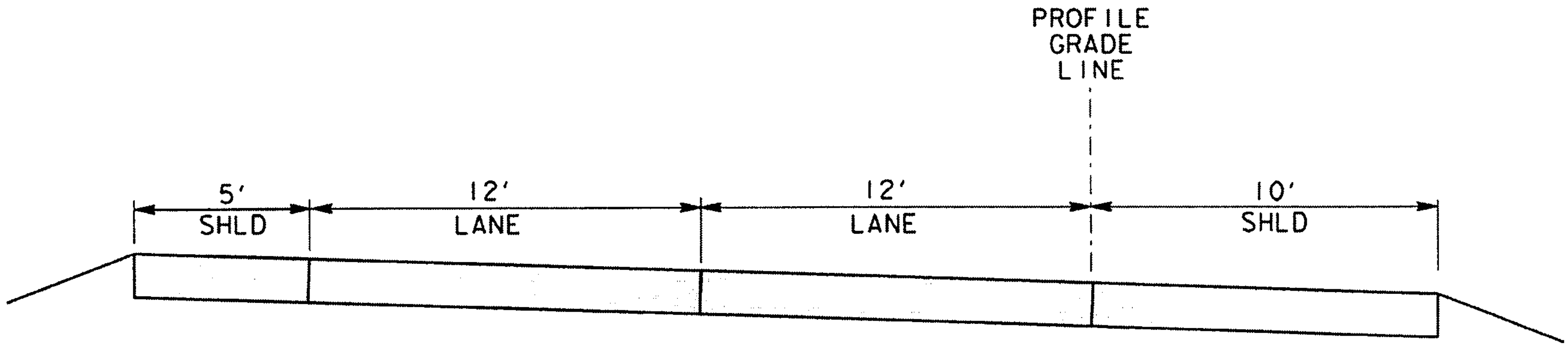
exclusive two-lane truck connection between freeways. The "low option" typically utilizes the existing mixed-flow interchange ramps with an additional lane added for increased capacity. All of the freeway-to-surface-street truck access ramps and some freeway-to-freeway connections were considered to be "low option" alternatives.

Due to existing physical constraints at some of the freeway-to-freeway interchanges, either the high or low option was eliminated from consideration at these locations. At the SR-60/SR-57 interchange (both north and south), the high option was dismissed due to obstructions and other clearance factors, and excessive right-of-way requirements. Conversely, at the northbound I-15 to westbound SR-60 interchange, only the high option was considered since use of the existing loop ramp for the low option would result in turning radii too severe for trucks. However, both connector options were evaluated for all other freeway-to-freeway locations.

As noted, all of the surface street truck ramps are essentially the low option configuration. These ramps employ the existing mixed-flow ramp facilities, with a new exclusive truck lane added for increased capacity. The following criteria were used in the design of these "low option" ramps:

- A single on or off lane for truck traffic was provided at each of the selected locations.
- The new truck lanes would be added to the outside of the existing ramp facilities.

The typical cross sections of the high and low option truck connectors are shown in Figures 11 and 12. Other design considerations for both the freeway-to-freeway connectors and intermediate surface street ramps are discussed in the following sections.



Source: HDR Engineering, Inc.

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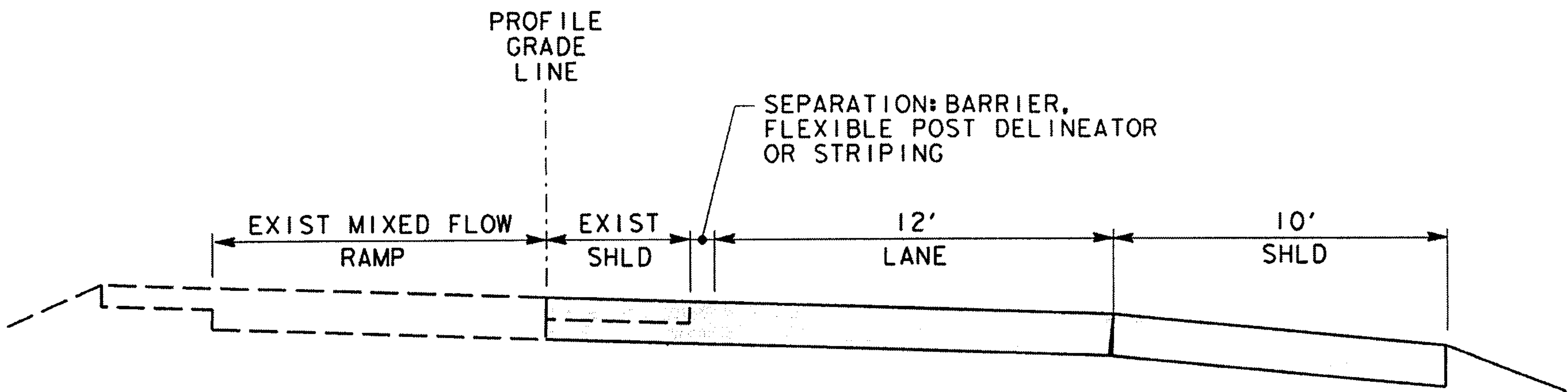
FIGURE 5.12
ROUTE 60–TYPICAL SECTION
2–LANE TRUCK RAMP (FREEWAY TO CONNECTOR–HIGH OPTION)



Source: HDR Engineering, Inc.

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FIGURE 5.13
ROUTE 60–TYPICAL SECTION
INTERMEDIATE TRUCK RAMP (1–LANE)

Horizontal Alignment

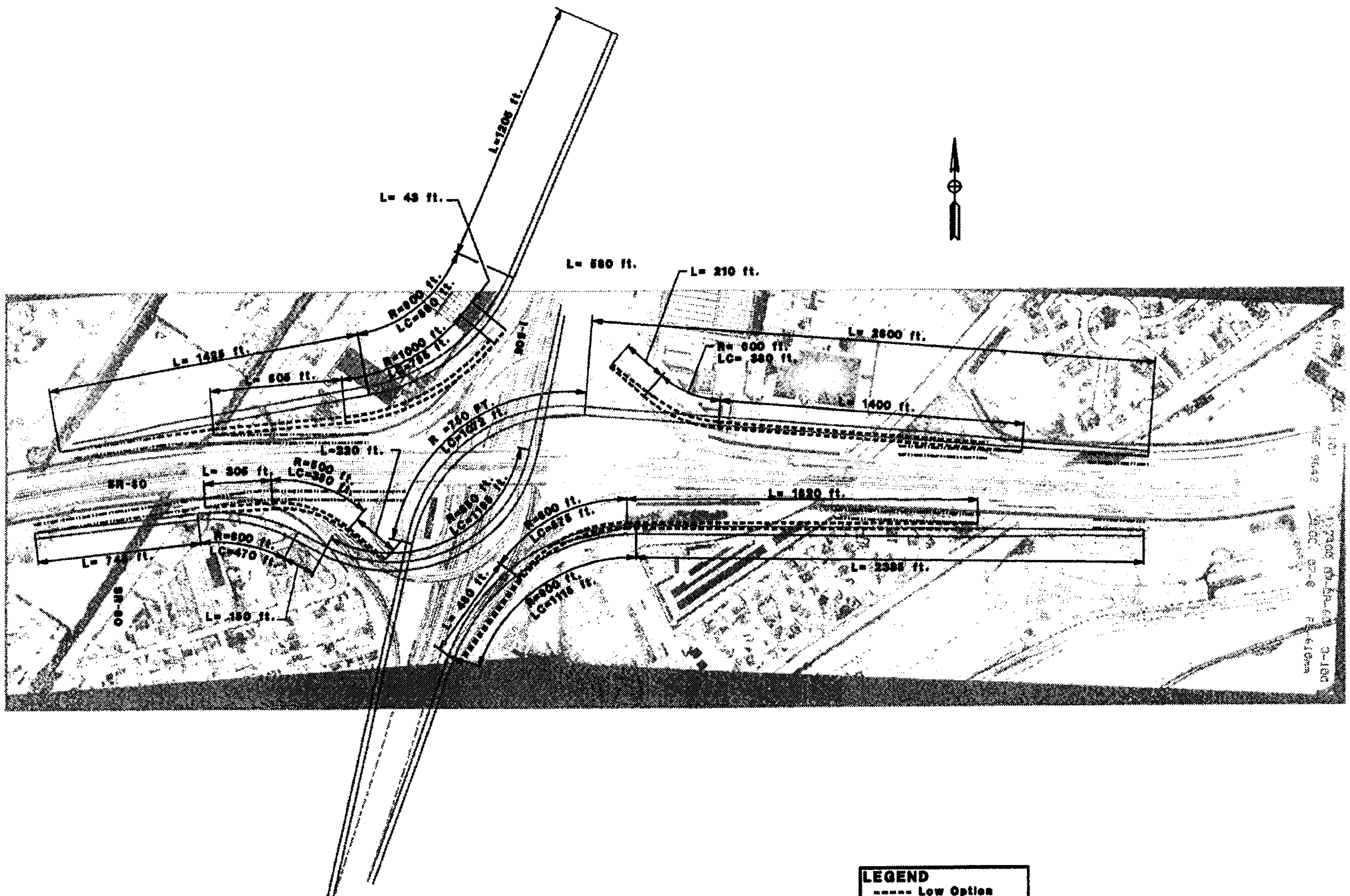
The horizontal alignment of the freeway connectors and access ramps attempted to maintain a maximum six-percent superelevation rate. Based on this assumption, the following table shows the relationship between design speed and minimum roadway radius. This data, which has been adjusted to account for the operating characteristics of truck traffic, was used in the preliminary design and evaluation of the truck connector facilities.

Design Speed (mph)	Minimum Radius (feet)
50	900
40	550
30	300
20	150

Wherever possible, a horizontal design speed of 50 mph should be used for the freeway-to-freeway connector facilities, although in locations where this design will result in excessive right-of-way acquisition, lower design speeds could be utilized. These locations include SR-60 EB to 1-605 NB, SR-60 WB to 1-605 SB SR-60 EB to 1-15 SB and SR-60 EB to 1-15 NB. The trade-off between design speed and right-of-way requirements is not addressed in this study; it is reserved for more detailed design.

Additionally, the designs for the "high option" freeway connectors assumed a maximum support column spacing of 250 feet, and that the SR-60 median would not accommodate these columns. Finally, the design of both the freeway-to-freeway connector facilities and interim surface street access ramps assumed that the minimum spacing between successive on-ramps or off-ramps was no less than 900 feet.

Based on the design criteria discussed above, the preliminary horizontal alignments for the freeway-to-freeway locations and for the surface street access ramps were developed. Figures 13 through 15 illustrate examples of these alignments. A complete set is available upon request.



Source: HDR Engineering, Inc.

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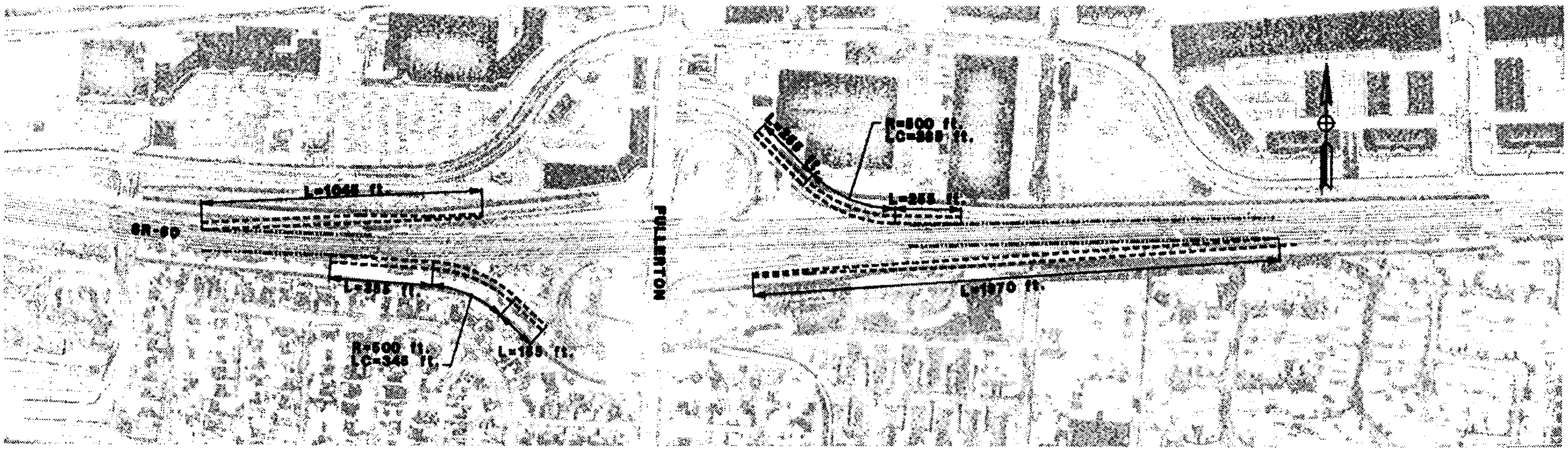
FIGURE 5.14
FREEWAY TO FREEWAY CONNECTOR
HORIZONTAL ALIGNMENT – SR-60/I-605 INTERCHANGE



LEGEND
Truck Ramps
Truck Lanes
Existing Lanes

Source: HDR Engineering, Inc.

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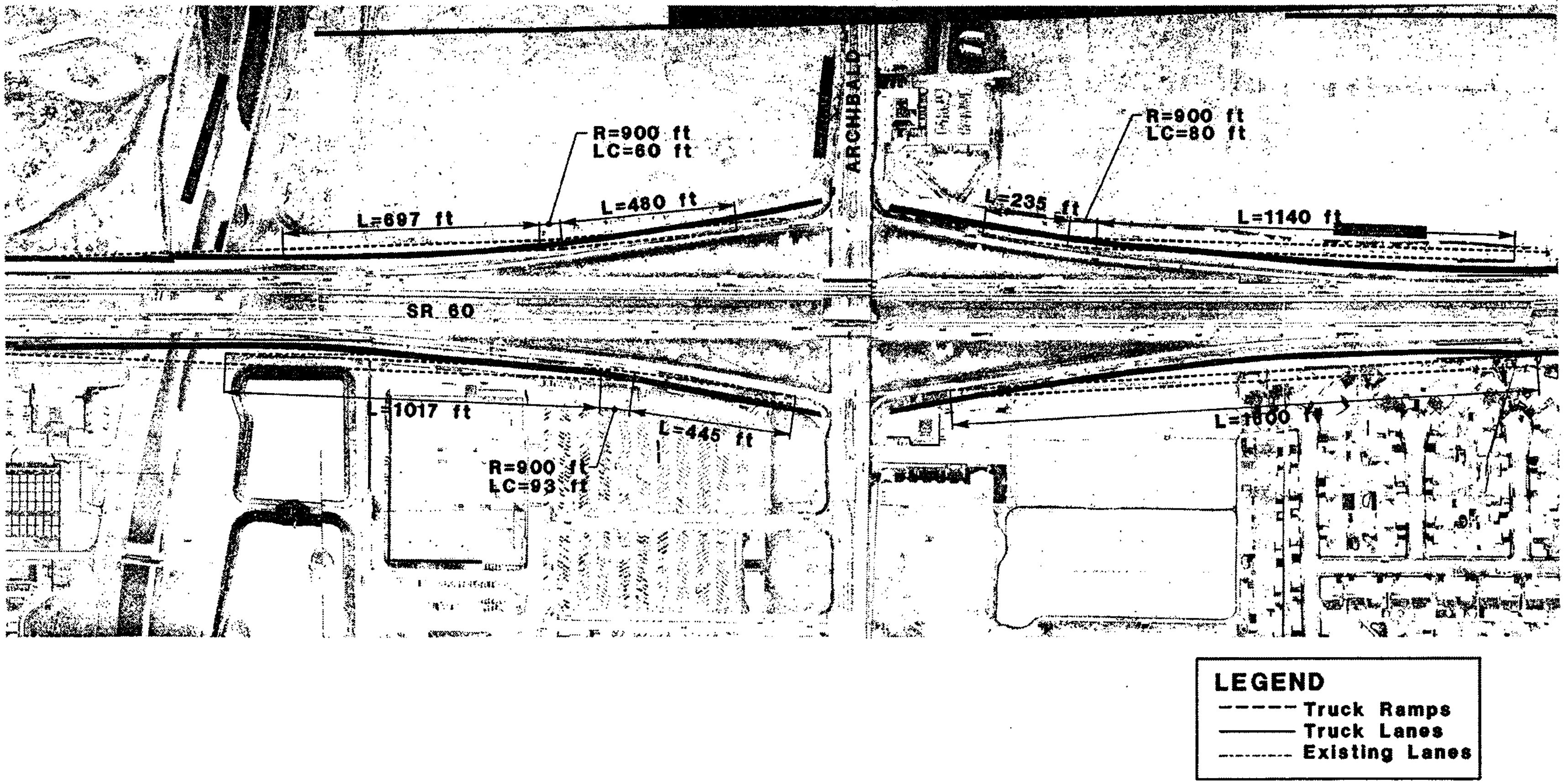
FIGURE 5.15
SURFACE STREET ACCESS RAMP FROM ELEVATED LANES
HORIZONTAL ALIGNMENT – SR-60 @ FULLERTON ROAD



Source: HDR Engineering, Inc.

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FIGURE 5.16
SURFACE STREET ACCESS RAMP FROM AT-GRADE LANES
HORIZONTAL ALIGNMENT – SR-60 @ ARCHIBALD AVENUE

Vertical Alignment

The vertical alignments and clearances for the freeway connectors and truck access ramps were also an important consideration. The following design criteria and assumptions were utilized in the design of these truck lane facilities.

- A maximum vertical grade of five percent was used as the goal for all high option connectors.
- All low option connectors and intermediate ramps will match existing grades.
- All existing structures with non-standard clearance would be replaced.
- Proposed truck ramp overcrossings with existing structures were designed for 19-foot clearances, including structure depth.
- Proposed truck ramp undercrossings with existing structures were designed for 21-foot clearances, including structure depth, based on a minimum 18-foot vertical clearance requested by the South Region Transportation Permits Office in order to allow the SR-60 to qualify as a designated truck corridor.
- All elevations are referenced to the pavement surface of SR-60 as 0.0 feet.

Tables 11 and 12 summarize the vertical grades for both the freeway-to-freeway connectors and the surface street ramp facilities. The estimated grades shown in the table for surface street ramps are approximations based on assumptions of 19-foot clearances between existing roadbeds, linear interpolation of grades between the roadbeds, and other factors. The table indicates that all proposed connector and ramp layouts meet the maximum-grade requirement with the exception of the westbound SR-60 to southbound I-710 "high option" connector and the eastbound SR-60 off ramp to northbound Hacienda Boulevard. Due to the built up area in the location of the SR-60/I-710 interchange and the proximity of structures to the I-710, lowering of the grade to five percent may not be possible without excessive right-of-way acquisition and reconstruction of some existing structures. The off-ramp at Hacienda Boulevard exceeds the general five-percent vertical grade design goal, but follows the same profile as the existing ramp facilities. However, the approximate six-percent grades for these two facilities are still within acceptable limits of operations for truck traffic.

TABLE 5.11
VERTICAL GRADES - FREEWAY-TO-FREEWAY CONNECTORS

Location	Maximum grade*	Design Speed ** (mph)
I-710 NB - SR-60 EB - High Option	1.3%	
I-710 NB - SR-60 EB - Low Option	*2.1%*	
SR-60 WB - I-710 SB - High Option	6.0%	50
SR-60 WB - I-710 SB - Low Option	*0.0%*	
I-605 SB - SR-60 WB - High Option	0.5%	
I-605 SB- SR-60 WB - Low Option	*1.4%*	
I-605 NB - SR-60 EB - High Option	4.6%	50
I-605 NB - SR-60 EB - Low Option	*0.7%*	
SR-60 EB - I-605 NB - High Option	4.4%	50
SR-60 EB - I-605 NB - Low Option	*1.4%*	
SR-60 WB - I-605 SB - High Option	3.8%	50
SR-60 WB - I-605 SB - Low Option	*0.5%*	
SR-57 NB (south leg) - SR-60 EB - Low Option	*1.8%*	
SR-60 WB - SR-57 SB (south leg) - Low Option	*0.9%*	
SR-60 EB - SR-57 NB (north leg) - Low Option	*1.6%*	
SR-57 SB (north leg) - SR-60 WB - Low Option	*1.7%*	
SR-60 EB - I-15 SB - High Option	2.2%	
SR-60 EB - I-15 SB - Low Option	0.6%	
I-15 SB - SR-60 WB - High Option	0.3%	
I-15 SB - SR-60 WB - Low Option	0.6%	
I-15 NB - SR-60 WB - High Option	4.2%	50
I-15 NB - SR-60 WB - Low Option	Not used; turning radius for trucks will be severe	
SR-60 EB - I-15 NB - High Option	4.0%	50
SR-60 EB - I-15 NB - Low Option	6.5%	

Notes:

* All "low option" connectors will match the existing grade, the maximum grades stated are estimates only based on gross asumptions of vertical clerances of 19 feet between existing roadbeds, a linear interpolation of grades between the roadbeds and engineering judgement.

** Design speed based on sight distance for vertical curves, only shown if vertical curve occurs.

TABLE 5.12

VERTICAL GRADES - SURFACE STREET RAMPS

Surface Street	**Ramp**	**Maximum grade**
Atlantic Boulevard	Eastbound off-ramp	*1.9%*
	Eastbound on-ramp	*2.7%*
	Westbound off-ramp	*2.6%*
	Westbound on-ramp	*1.6%*
Paramount Boulevard	Eastbound off-ramp	*1.3%*
	Eastbound on-ramp	*1.5%*
	Westbound off-ramp	*4.6%*
	Westbound on-ramp	*1.3%*
Rosemead Boulevard	Eastbound off-ramp	*1.3%*
	Eastbound on-ramp	*1.2%*
	Westbound off-ramp	*1.2%*
	Westbound on-ramp	*0.9%*
Hacienda Boulevard	Eastbound off-ramp	*2.7%*
	Eastbound on-ramp	*6.1%*
	Westbound off-ramp	*2.5%*
	Westbound on-ramp	*2.7%*
Fullerton Road	Eastbound off-ramp	*4.3%*
	Eastbound on-ramp	*1.9%*
	Westbound off-ramp	*4.2%*
	Westbound on-ramp	*3.6%*
Fairway Drive	Eastbound off-ramp	*1.3%*
	Eastbound on-ramp	*1.3%*
	Westbound off-ramp	*1.4%*
	Westbound on-ramp	*1.4%*
Reservoir Street	Eastbound off-ramp	*3.0%*
	Eastbound on-ramp	*1.6%*
	Westbound off-ramp	*1.0%*
	Westbound on-ramp	*3.3%*
Archibald Avenue	Eastbound off-ramp	*1.2%*
	Eastbound on-ramp	*1.2%*
	Westbound off-ramp	*1.3%*
	Westbound on-ramp	*1.5%*
Grove Avenue	Eastbound off-ramp	*0.7%*
	Eastbound on-ramp	*0.9%*
	Westbound off-ramp	*0.9%*
	Westbound on-ramp	*2.6%*
Milliken Avenue	Westbound on-ramp	*0.9%*
Etiwanda Avenue	Eastbound off-ramp	*1.1%*
	Westbound on-ramp	*1.0%*

Note:
All ramps will match the existing grade, the maximum grades stated are estimates only based on gross asumptions of vertical clerances of 19 feet between existing roadbeds, a linear interpolation of grades between the roadbeds and engineering judgement.

Other Considerations

- The design of the freeway connectors at the SR-60/SR-57 interchanges (both north and south) included consideration of the approved Caltrans Project Study Report (PSR) dated October 29, 1993, detailing improvements planned for the section of the freeways between Brea Canyon Road and Grand Avenue (EA 12570K).

INFRASTRUCTURE COSTS METHODOLOGY

The methodology used to determine the infrastructure costs for each of the SR-60 truck lanes alternatives involved the development of several "modules". These modules when combined appropriately represent each alternative. Each module is a typical construction configuration that will be encountered in the corridor. Thirteen distinct modules were identified for this study corridor ranging from constructing one lane at the freeway grade to removing and replacing a sound wall. Furthermore, a unit cost was derived for each module which provided the basis for the pricing of the different alternatives.

The following criteria were used to compute each unit cost:

- All unit costs are presented in Year 2000 US dollars. When the literature contained costs from previous years, they were adjusted using a 2% cost increase per year, compounded, as recommended by Caltrans.
- Data to compute the unit costs were obtained and cross-checked from several sources including the Caltrans Contract Cost Item Book, the Caltrans Price Index for Selected Highway Construction Items and the Means Construction Cost Data.
- The pavement and shoulder characteristic section used to compute the unit costs was the Truck Section 9 used in the 1989 estimate for 1-105, as provided by Caltrans.
- The overall format used was based on the Caltrans format for Project Reports cost estimating, as outlined in the Caltrans Project Development Procedures Manual.

- The engineering and construction management costs were assumed to be 30% of the construction costs, as recommended by Caltrans.
- The unit of a "lane-mile" (cost of one lane over a length of one mile) was used when appropriate to facilitate comparison between the various components and for ease of computation.

Table 5 shows the derived unit costs for the thirteen modules used to price this corridor. The breakdown of all the elements comprising each module along with their individual costs is presented in Appendix A.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) COMPONENTS

An objective of the SR-60 Truck Lane Feasibility Study is to afford the opportunity to incorporate intelligent transportation systems (ITS) components into the project alternatives; it is not likely that ITS components would supplant improvements which add significant capacity to the corridor. For the last several years, a number of statewide and regional "ITS Deployment Initiatives" have been proposed and evaluated by the California Alliance for Advanced Transportation Systems (CAATS) and the Southern California ITS Priority Corridor Steering Committee. Those initiatives pertaining to commercial vehicles operations may be considered as components of truck lane implementation in the SR-60 corridor. Each of them would be applicable in the corridor regardless of the particular project alternative pursued; indeed, they could be applied in the corridor without the introduction of dedicated truck lanes.

The ITS commercial-vehicle deployment initiatives being pursued by CAATS and the Steering Committee are intended to:

- Provide enhanced ability for response to incidents involving commercial vehicles by increasing the presence of larger-size tow trucks equipped with gear and supplies frequently needed to clear and clean up overturned commercial vehicles.
- Facilitate clearance, minimizing delay by implementing "electronic vehicle registration linkage" and "electronic permitting system" which allow a carrier/driver/trader to electronically file, obtain and pay for most required

TABLE 5.13
SR-60 TRUCK LANE FEASIBILITY STUDY UNIT COSTS

DESCRIPTION	UNIT	COST in yr 2000 US $1000
Shift/Realign Exist Ramps	Ramp	3,439
New Ramp (at grade)	Ramp	2,990
New Ramp (structure)	Ramp	32,904
Add Lane under OC (no structure impacts)	Lane Mile	2,585
Add Lane under OC (new structure)	Lane Mile	6,368
Add Lane under OC (modify structure, use tie-backs)	Lane Mile	2,950
Add Lane over UC	Lane Mile	16,682
Add Lane (at grade)	Lane Mile	2,585
Add Lane (in fill section)	Lane Mile	13,260
Add Lane (in cut section)	Lane Mile	14,616
Add Structure in Median	Lane Mile	97,044
Add Structure over OC	Lane Mile	32,030
Remove & Replace Noise Barrier	Mile	2,415

Notes:

1 All Unit Cost are in Year 2000 Dollars.
2 Base Unit Costs from previous years were adjusted using 2% per year compounded, as recommended by Caltrans.
3 Right of Way Costs and Environmental Mitigation costs are NOT included.
4 New Bridge construction to meet the 18 feet Vertical Clearance requirement in accordance to Caltrans requirements may require additional re-construction of surface streets at the tie in sections. The current cost estimate does not include these potential additional costs.

licenses, registrations, permits and international trade documents. An electronic record is sent using Electronic Data Interchange (EDI) standards to the motor carrier's headquarters, a specified location or the regulatory agencies associated with the document (e.g., Commercial Vehicle Information System Network— CVISN—or International Trade Data System—ITDS—or both). A fully integrated system will allow freight facilities or agencies to initiate and maintain documents necessary to support fleet management and commercial vehicle operations.

- Provide pre-trip and en-route weather, congestion and incident data for most efficient routing (by introducing a "regional road/weather information system" and "map guidelines")
- Integrate Transportation Management Centers to support statewide commercial vehicle navigation and traffic information ("multimodal information exchange and interface")
- Provide more efficient roadside inspections and stops to automatically and accurately identify carriers and vehicles and verify credentials for clearance at ports of entry, highway inspection facilities and the international border. An enhanced commercial vehicle management and information system will interact with existing and proposed freight facility information management systems to (1) support "just-in-time" pick-up and delivery service and (2) verify specific credentials to determine if a carrier/vehicle/driver/cargo is in compliance.
- Sense the safety of a commercial vehicle, cargo and driver--beginning by "testing and implementing new safety technologies" which verify that carriers, vehicles and drivers meet safety thresholds as determined by such agencies as the CHP. Such management systems as CVISN and Safety and Fitness Electronic Records (SAFER) are used to clear vehicles through inspection stations more quickly and efficiently.
- Provide immediate description of hazardous materials to emergency management and law enforcement systems and feedback about incidents and road hazards to travelers and truck drivers/dispatchers.
- Provide information services and communications among drivers, dispatchers, receivers and fleet managers as a customized subset of the Caltrans/CHP Transportation Management Centers and cities' traffic control. Customized information is envisioned to include incident detection and classification and identification of and guidance on alternative routings. Real-time customized

information services to end-users (i.e., drivers and dispatcher) will use such tools as the Internet, off-highway kiosks, cellular telephones and paging systems. An end-user could place standing requests for enhanced information about congestion, incident alerts, road conditions, scheduled construction, weather alerts, facility capacities, "Yellow Pages" information, scheduled events which might cause congestion and alternate routes. All of this information would serve to enable better "just-in-time" pick-up and delivery, which is driving growth in truck traffic.

None of the regional or statewide initiatives is sufficiently advanced at this time to allow specification of either implementation requirements or costs for inclusion in the description of project alternatives in the SR-60 corridor. Under the leadership of the Steering Committee and the San Diego Association of Governments, regional implementation of an advanced traveler information system applicable and useful to commercial vehicles is just getting underway.

The state of development of commercial-vehicle ITS implementation in Southern California at the time an implementation plan is defined will be reflected in work presented for Task 10 of the SR-60 Truck Lane Feasibility Study.

V. LAYOUT DRAWINGS

The layout drawings and geometrics for the recommended alternatives have been provided to Caltrans under separate cover. All geometrics are in compliance with Caltrans mandatory standards.

Chapter 6
Recommended Alternative

CONSIDERATION OF THE ALTERNATIVES

In the fall of 1999, the Truck Lane Task Force identified three main strategies as sensible to the SR-60 corridor: allowing trucks to share the carpool lanes at limited time periods, adding truck lanes to the freeway at grade and adding lanes above the freeway grade. Based on the characteristics of each alternative for each criteria and on the year 2020 truck volumes forecast to use the truck facility, the Task Force subsequently decided that some of the preliminary strategies would not be ideal to this particular corridor. The "mix trucks with carpools" alternative created safety problems due to the variability of speed between automobiles and trucks and blocked visibility. Operationally, it did not allow for passing opportunities or storage space for breakdowns. It also invoked regulatory issues since state law limits trucks to right lanes, and carpool lanes contain usage limitations due to funding sources. Finally, upon examination of the estimated year 2020 truck volumes, it was determined that there is demand for a four lane truck facility and this option does not provide any added capacity to the corridor.

The year 2020 truck volumes forecast indicated that a four-lane facility would be required to accommodate the truck demand. Consequently, only the alternatives recommending the addition of four truck lanes were examined in a more detailed analysis. The Task 5 and Task 6 reports analyze two final conceptual alternatives: adding four lanes at grade and adding four lanes above the freeway grade.

In the Task 5 Report, these alternatives were analyzed based on operational conditions, safety, physical constraints and cost. An environmental assessment for each alternative was also performed, and it is documented in the Task 7 Report.

The length of the SR-60 study corridor warranted the subdivision of the corridor into smaller segments to simplify the study. The corridor was segmented into eight parts that present similar conditions, and therefore can be analyzed as a unit. For each segment, the physical constraints presented along the freeway were evaluated. The vertical constraints, which were of particular relevance for the above freeway grade alternative, were considered in the conceptual design of the new facility (see Chapter 3 for more details). Furthermore, all additional costs inferred by these constraints such as provision of enough vertical clearance were included in the estimated construction costs for both alternatives.

The horizontal constraints are greater since they involve the acquisition of new right-of-way. A summary of right-of-way requirements for each of the alternatives is presented by segment in Tables 1 through 8. These tables illustrate the nature and quantity of properties required to be acquired for the implementation of each of the alternatives. They also contain the estimated cost associated with such acquisition. The properties are classified as residential units, businesses, industrial properties, schools and golf courses or parks. Another consequence of the additional right-of-way requirement involves the relocation of local and arterial streets to accommodate the new facility. The tables present the type of city-street and the length of the portion requiring relocation as well as the estimated cost associated with the relocation.

Another important piece of information provided in Tables 1 through 8 is the estimated cost to construct the segment for each alternative. This estimated cost has to be compared with the other criteria such as physical constraints, operational conditions and safety assessments to determine the best option for each segment. The unit costs presented in the Task 5 Report, which include roadway items (pavement, earthwork, drainage, utilities, traffic control, etc...), structure items (bridges/overpasses) and construction items (engineering, construction management), were combined with the estimated right-of-way acquisition and city-street relocation costs to yield the total estimated cost to build each segment for both alternatives.

Both operational and safety issues regarding the truck facility were addressed in the Task 5 Report. An elevated truck facility is more likely to provide operational and safety concerns than an at-grade facility. Operationally, longer ramps are required in an elevated structure to accommodate truck deceleration on exit ramps (due to downgrade) and to accommodate truck acceleration on the entrance ramps (due to upgrade). Safety concerns involve the incident response on elevated sections which are often more challenging than for at-grade sections depending on the specific geometrics involved. The security underneath elevated structures, regardless of the vehicle type using the facility, is also a concern. However, if the design of the facility is appropriate, these operational and safety issues may be mitigated.

SECTION I
I-710 TO VAIL

3.1 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$516	83 $33	29 $29	none	2 $20	2 16' & 2 22' strips $4	0.5 mile $1	4.5 miles $15

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$137	none	none	none	none	none		

Cost Increment for "Above Freeway" : 27%

TABLE 6.1
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION II
VAIL TO SANTA ANITA

3.9 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$284	58 $23	none	none	none	1 13', 1 18' & 1 30' strips	1.0 mile $2	1.5 miles $5

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$311	none	none	none	none	none		

Cost Increment for "Above Freeway" : **110%**

TABLE 6.2
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION III
SANTA ANITA TO 7TH AVE

4.1 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$456	106 $32	6 $12	13 $26	1 $10	1 44' strip $1	1.0 mile $2	1.5 miles $5

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$344	11 $4	6 $12	1 $2	none	none		

Cost Increment for "Above Freeway" : **75%**

TABLE 6.3
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION IV
7TH AVE TO FULLERTON

5.2 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$624	206 $83	10 $25	10 $20	2 $20	2 14' & 1 19' strips $3	2 miles $3.40	1.0 mile $3.40

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$259	none	none	none	none	none		

Cost Increment for "Above Freeway" : **42%**

TABLE 6.4
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION V
FULLERTON TO GRAND

5.0 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$519	98 $39	2 $5	4 $8	1 $10	1 17' strip $1	1.5 miles $3	

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$340	none	none	none	none	none		

Cost Increment for "Above Freeway" : **66%**

TABLE 6.5
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION VI
GRAND TO RESERVOIR

5.9 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$669	23 $12	1 $3	1 $2	1 $10	2 17' strips $2		

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$323	none	none	none	none	none		

Cost Increment for "Above Freeway" : **48%**

TABLE 6.6
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION VII
RESERVOIR TO EUCLID

4.7 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$381	32 $13	none	none	none	none	0.5 mile $1	

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$302	none	none	none	none	none		

Cost Increment for "Above Freeway" : 79%

TABLE 6.7
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

SECTION VIII
EUCLID TO I-15

5.9 miles

Strategy: Add Two Lanes (each direction) at Freeway Grade

Estimated Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$407	117 $35	none	none	none	2 7' & 1 13' strips $3		

Strategy: Add Two Lanes (each direction) above Freeway Grade

Estimated Additional Cost with Allowance for Right-of-Way (in millions)	Right-of-Way Acquisitions					Move Local Street	Move Arterial Street
	Residential Units	Businesses	Industrial Properties	Schools	Golf Courses/ Parks		
$411	none	none	none	none	none		

Cost Increment for "Above Freeway" : **101%**

TABLE 6.8
SR-60 TRUCK LANES ALTERNATIVES
RIGHT-OF-WAY REUQIREMENTS AND COST

A recommended alternative was developed combining elements of both analyzed alternatives to form a hybrid solution. The recommended alternative consists mostly of adding four truck lanes at grade with aerial sections at the western end of the corridor (from I-710 to Vail Street) and east of the I-605 (from I-605 to Fullerton Road). It is shown on Figure 1. The aerial portions were minimized due to safety and operational considerations regarding trucks traveling on an elevated structure as well as due to higher construction costs. Besides minimizing the aerial portions, to ensure the best possible design for the new facility, consultants investigated the option of using the aerial portions for mixed flow/HOV traffic and using the "freed-up" capacity of the existing freeway for the exclusive truck lanes. However, this option proved not viable due to (1) the considerable additional facilities required to provide access for mixed-flow traffic at all intermediate surface locations occurring along the aerial portions while trucks only require access at key surface streets, (2) pavement structural weight constraints on the existing facility, and (3) separation of the mixed flow traffic since only one HOV lane in each direction is provided. The two segments where aerial sections are recommended would involve an extreme amount of property acquisitions to provide the required right-of-way at freeway grade, and many of these properties are sensitive properties such as schools. Consequently, it was deemed optimal to consider the dedicated truck-lane facility at freeway grade except for those two segments.

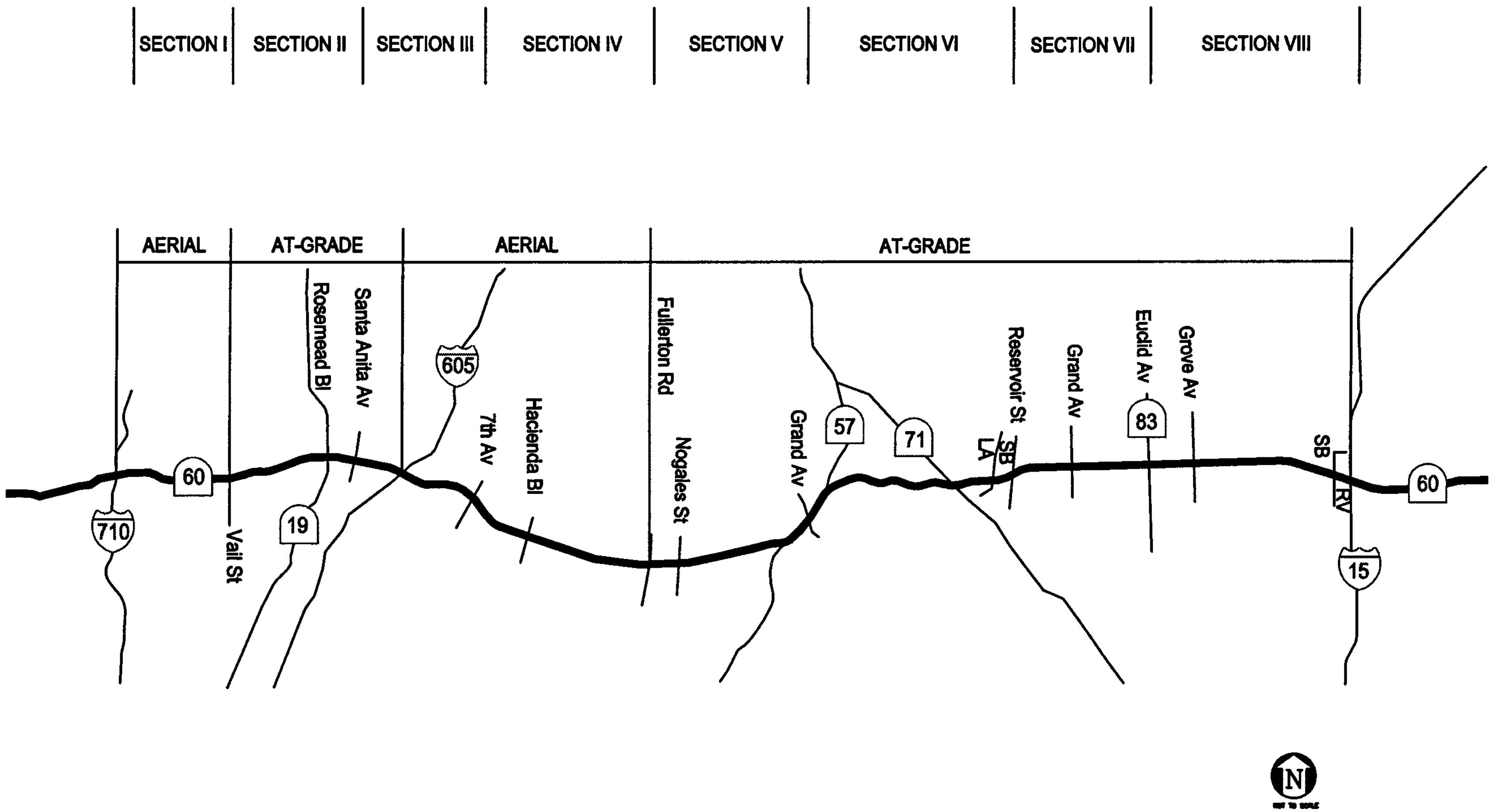

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FIGURE 6.1
RECOMMENDED ALTERNATIVE

CONCLUSIONS

This study has been asked to assess the feasibility of dedicated truck lanes in order to more efficiently keep goods movement flowing smoothly, improve overall mobility along the freeway, and improve traffic safety and air quality issues. The work in this SR-60 Truck Lane Feasibility Study has focused on such factors as design alternatives, financial impact, highway operations, safety considerations, environmental impacts and regional benefits.

The consultant team conducting the SR-60 Truck Lane Feasibility Study has concluded that dedicated truck lanes are feasible under certain conditions, described below. Other task reports document the results of the evaluation of conceptual alternative improvements. This evaluation was based on several criteria including accessibility and mobility, cost-effectiveness, safety impacts, operational characteristics, regulatory concerns, regional benefits and environmental sensitivity.

TECHNICAL FEASIBILITY

Truck-volume forecasts for the year 2020 made by SCAG's Heavy Duty Truck Model indicate that a four-lane (two in each direction) facility would be required to accommodate the truck demand. The following table gives details from SCAG's Model (1994 is the Model's "base year"); the capacity of a truck lane is 800 – 1,000 trucks per hour.

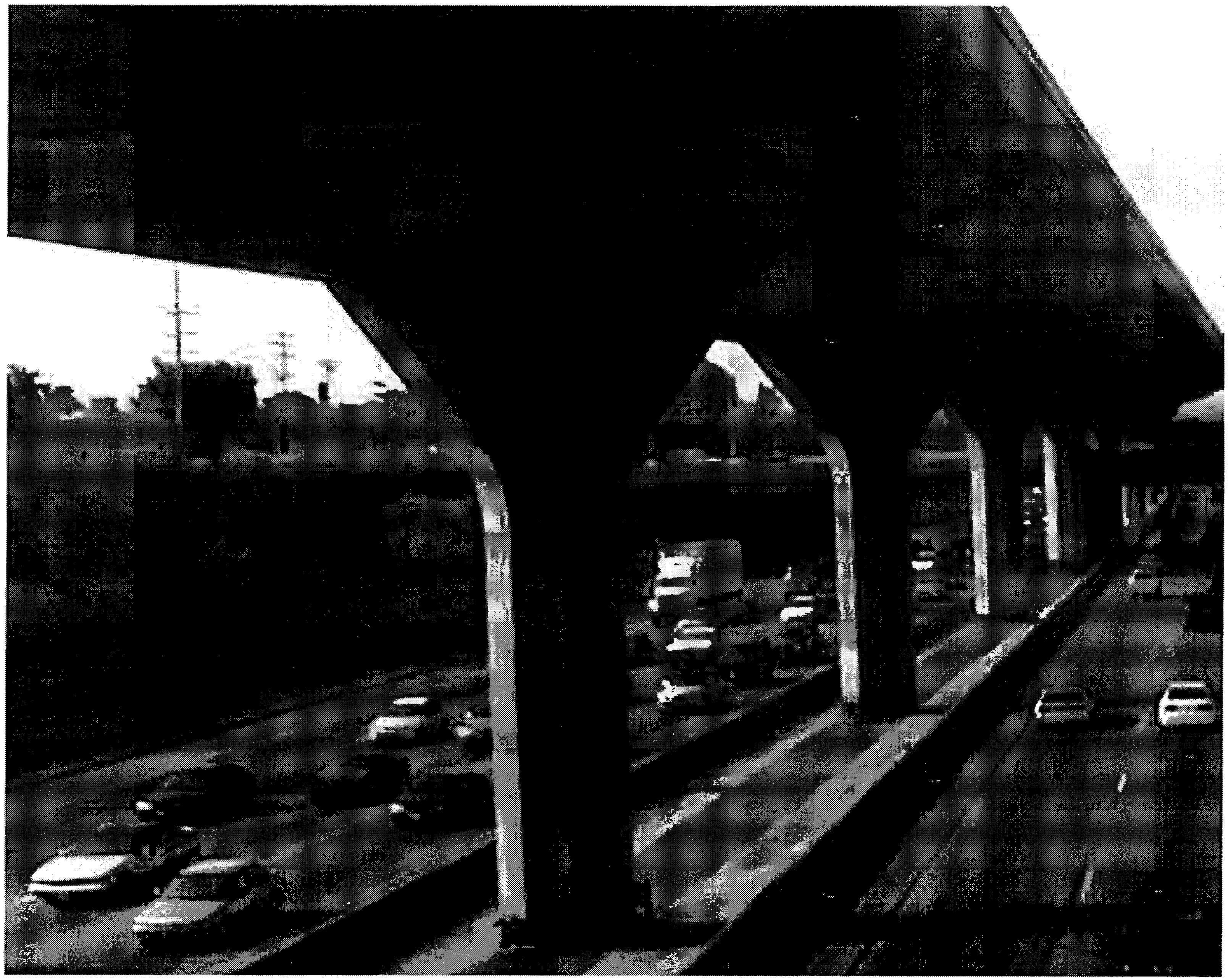
	Truck Volume per Hour per Direction		
Location	**1994**	**2020**	**Growth 1994-2020**
West End	1,890	2,850	960
East of I-605	1,360	2,200	840
SR-57 Junction	1,474	2,970	1,500
East of SR-71 Junction	1,180	2,310	1,130
East End	2,200	4,000	1,800

Consequently, the consultant reports analyze two final conceptual alternatives: adding four lanes at grade and adding four lanes above the freeway grade.

The at-grade widening alternative would require acquisition of new right-of-way at various locations along the corridor. This would affect residences, businesses and commercial buildings as well as schools, parks and other environmentally sensitive areas adjacent to the freeway. Impacts of elevated segments would be of a lesser degree. **All of these impacts would require comprehensive environmental studies before a project can be approved for implementation.** Those studies should more fully evaluate other alternatives—noted during the community outreach just completed—including all potential alternative alignments.

The recommended alternative in Figure 1 was developed combining elements of both analyzed alternatives to form a hybrid solution. The recommended alternative consists mostly of adding four truck lanes at grade with aerial sections at the western end of the corridor (from I-710 to Vail Street) and east of I-605 (from I-605 to Fullerton Road). Figures 3 and 4 show what each section would look like. Aerial portions should be kept to a minimum due to safety and operational considerations regarding trucks traveling on an elevated structure as well as due to higher construction costs. In the two segments of the corridor where aerial section is recommended, we believe elevating the truck lanes will avoid the extreme amount of property acquisitions necessary in those locations to provide the required right-of-way at freeway grade (many of these properties are sensitive properties such as schools). Consequently, we believe further work should consider the dedicated truck-lane facility at freeway grade except for those two segments. That work should also include design and operational studies that consider having the HOV or mixed-flow lanes on the elevated segments, keeping all trucks at freeway grade.

Conclusion: If the option is pursued to add an elevated structure in designated portions of the corridor, truck lanes are feasible from the perspective of engineering and environmental considerations.



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A Corporation

Figure 6.2
I-710 to Vail and I-605 to Fullerton

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A Corporation

Figure 6.3
Other Sections of SR-60

COMMUNITY FEASIBILITY

Community outreach for this feasibility study has been reported in the Task 7 Report. That report reached this **conclusion: If all potential alternative alignments are given due consideration in further project development, the community along the corridor is likely to consider truck lanes to be feasible.**

FINANCIAL FEASIBILITY

Our analysis shows that at most $1.2 billion of $4.3 billion in corridor construction costs could be financed by leveraging the net revenue from truck-lane user fees. With a large gap between user-fee revenue and construction cost, it seems unlikely that other private sources of funding could be found. Therefore, **project construction will require an infusion of capital from local, state and federal sources.**

This public investment may be justified because providing dedicated truck lanes would reduce the requirement for mixed-flow lanes on the SR-60 freeway in 2020. The bar chart in Figure 5 is the product of comparing four forecasts of the number of mixed-flow traffic lanes. The first bar shows the number of additional mixed-flow lanes which the SCAG Model forecasts would be necessary in the SR-60 corridor to maintain the current peak-period level of service; that bar is labeled "*w/o Truck Lanes (per SCAG Model).*" The second bar—labeled "*w/ Four Truck Lanes (per SCAG Model)*"—allows us to see the impact of introducing four truck lanes (two in each direction) on the number of mixed-flow lanes forecasted to be required. Inspecting the difference between the first two bars reveals that in most areas one fewer mixed-flow lane per direction would be needed but in some areas that number is three fewer mixed-flow lanes. The third bar shows the difference made by the introduction of user fees on the truck lanes; in all but two areas, the reduction in additional mixed-flow lanes is eliminated by charging trucks to use the dedicated lanes.

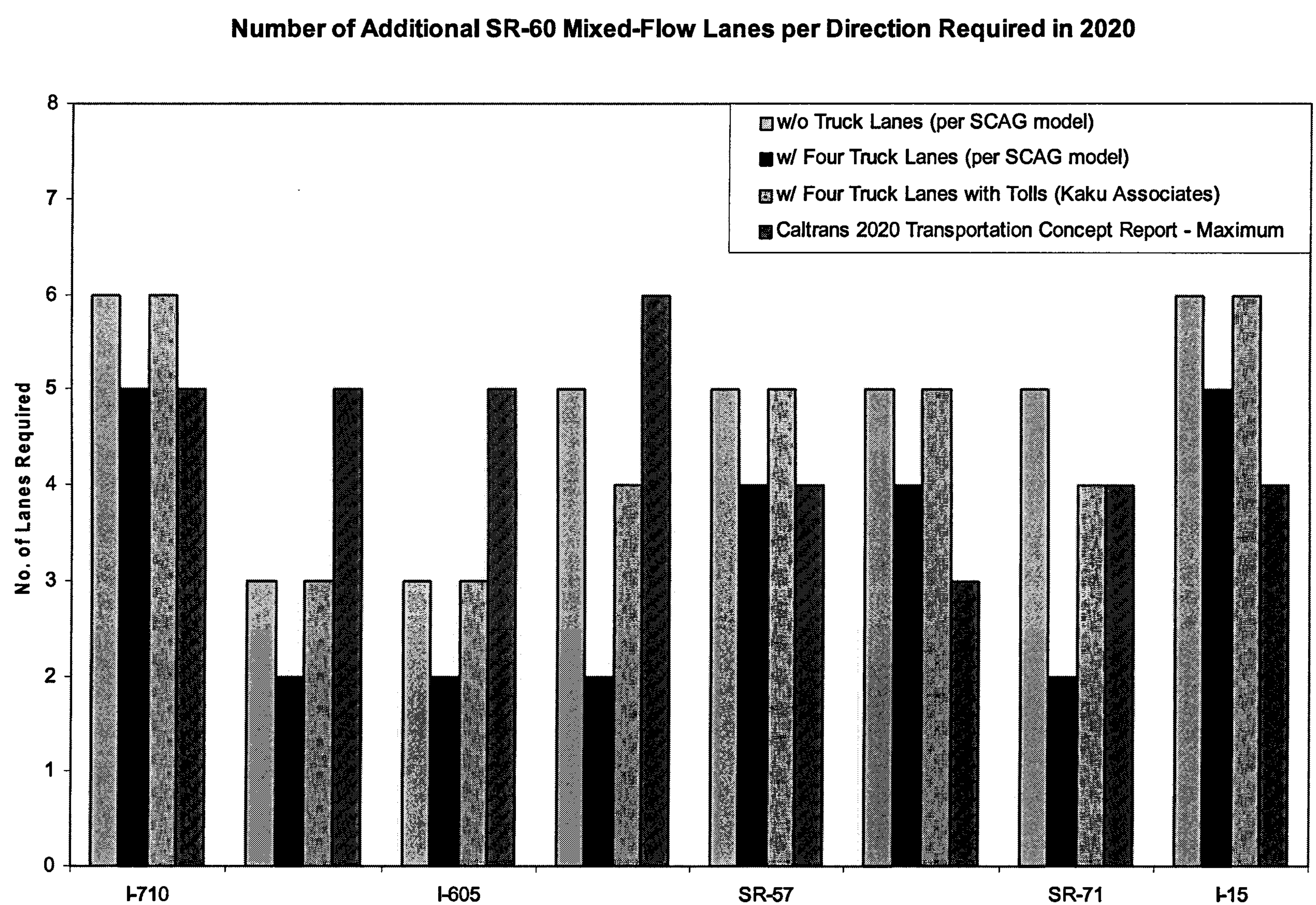

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FIGURE 6.4
Number of Additional SR-60 Mixed-Flow Lanes per Direction Required in 2020

The fourth bar on the chart is taken from the "Transportation Concept Report" (TCR) for SR-60 being drafted by Caltrans District 7, which evaluates the "ultimate" needs of the corridor as well as concepts for adding lanes to the freeway within the next 20 years. For comparison purposes only, we have shown the bar labeled *"Caltrans 2020 Transportation Concept Report – Maximum"* It indicates how many additional mixed-flow lanes (not taking truck lanes into account) Caltrans believes would be needed to attain a free-flowing SR-60 freeway.

While it is not considered feasible by any agency to add to the SR-60 freeway as many lanes as shown on the barchart, the comparison is useful to illustrate the contribution truck lanes could make to meeting the need for more capacity in the corridor.

Due to the large magnitude--both geographically and financially--of the SR-60 truck lanes, a detailed, incremental implementation strategy will need to be developed once a final determination is made of the improvements required. Our consultant reports have presented some preliminary implementation concepts to be refined in further work in the corridor. That future work should investigate various cost-recovery options in more depth than we have been assigned to do in this feasibility study. Such options might include different approaches to user fees and how they would affect demand for truck lanes plus a separated toll road in the corridor that is open to all vehicles with a fee structure for trucks and passenger vehicles that can be adjusted to reflect congestion levels.

Conclusion: If public recognition of the benefits of SR-60-corridor truck lanes to the overall transportation picture results in support for programming of public funding (federal, state and regional), truck lanes are financially feasible.